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THE CANADIAN

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VOLUME XV.

EDITED BY WILLIAM SAUNDERS.

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No. 1

TO OUR READERS.

With the present issue THE CANADIAN ENTOMOLOGIST enters upon the fifteenth year of its existence. During that long period it has had many friends, but these were never more numerous than at present, for the good work it has done and is still doing is recognized by all. While thanking those who have so kindly aided us in the past, we solicit a continuance of their support, and at the same time would request any of our younger Entomologists who may have observed any facts worth recording in reference to the habits or life history of any of our insects, to send them for publication, and thus aid us in our endeavors to make the fifteenth volume at least equal to any of its predecessors in usefulness.

We also take this opportunity of reminding our subscribers that subscriptions for the current year are now due. Remittances should be sent to the Secretary, E. Baynes Reed, London, Ontario.

ENTOMOLOGY FOR BEGINNERS.

BY THE EDITOR.

THE APPLE LEAF-CRUMPLER—*Phycita nebulo*.

During the winter there will often be found on apple trees clusters of curious little cases, partly and sometimes wholly hidden by portions of crumpled and withered leaves, as shown in figure 1. The withered leaves are firmly fastened to the cases by silken threads, and the cases to the bark of the twig on which they are placed. Each case resembles a long miniature horn, wide at one end, tapering almost to a point at the other, and twisted in a very odd manner, as shown at *a* and *b*, figure 2. It is curiously con-



Fig. 1.

structed of silk interwoven with the castings of the artificer, is lined internally with smooth, whitish silk, externally it is rougher and of a yellowish brown color.

Within this curious structure there dwells a small caterpillar, which during the winter months remains torpid, awakening to activity with the

warmth of spring. As the leaves of the apple tree begin to expand, the larva draws those that are nearest to it towards the case, and feeds on them, retreating quickly within its case when danger threatens. When full grown it is about six-tenths of an inch long, its body tapering slightly towards the hinder extremity. The head is dark reddish brown and the body dull greenish brown; the next segment to the head has a dark horny plate above and a flattened blackish prominence on each side. The head and anterior segments are shown at *c* in the figure. On each of the other

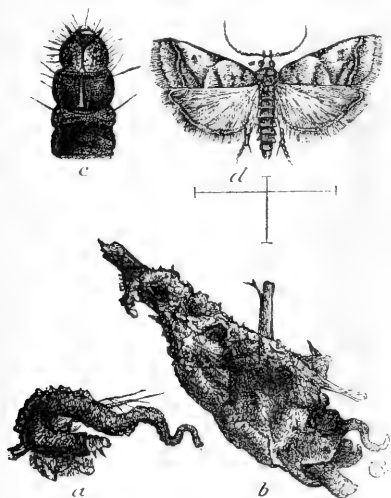


Fig. 2.

black dots, from each of which arises a single pale brown hair. When mature, which is usually during the early part of June, it closes the end of its case, and changes to a chrysalis within, about four-tenths of an inch long and of a reddish brown color, and in about a fortnight the moth appears.

When its wings are spread, the moth (*d*, figure 2) measures about seven-tenths of an inch across. Its fore wings are pale brown, with streaks and patches of silvery white, the hind wings plain brownish white; the under side of both wings paler. There is only one brood in a year. The moths deposit their eggs in the summer, and the larvæ construct their cases and attain about one-third of their growth before winter sets in.

Where these insects are abundant they become very injurious, consuming the young growth as it expands and materially affecting the vigor of the tree. To subdue them, pick the crumpled leaves with the cases from the trees and destroy them.

NEW SPECIES AND NOTES ON STRUCTURE OF MOTHS
AND GENERA.

BY A. R. GROTE, A. M.

(Continued from Vol. xiv., Page 237.)

YRIAS VOLUCRIS, n. s.

♂. Allied to *Repentis*, the lines having the same general course, but they are brown, not black, and the ground color is darker. The space included by the discal rounding of the t. p. line is not so large. The reniform shows a black included streak and the black costal dots on median space are as in its ally. The angles of the t. a. line are less sharp. There is a minute apical black mark on the margin, before which a paler shade, an approximation to the ocellate mark of *Clientis*. On hind wings the distinct black mesial line is wanting. Beneath the wings are paler at base and the lines very faint. *Expanse* 26 mil. Arizona. B. Neumoegen, Esq.

This species has a slight bluish cast above; the underlying color is more yellowish and brown. Several fresh specimens, undoubtedly distinct from *Repentis*.

The species may be arranged in the following order: *Clientis*, *Volucris*, *Repentis*, *Crudelis*.

PHEOCYMA UMBRINA, n. s.

♂ ♀. Soft brown, the male broken up by paler whitish linings to the subterminal line, the reniform, following the t. a. line and on secondaries across the middle of the wing. T. a. line oblique; t. p. line uneven, widely exserted; s. t. line upright, a little indented on vein 2, and just below costa. In the female these light shades are wanting and replaced by soft brown; the reniform being a little pale. Fringes dotted, especially noticeable beneath, where the under surface is blackish, discoloured, with the common extra-mesial line distinct. On hind wings above, the outer line is thick and black, expiring before costa, followed by pale lining in the male. *Expanse*, male, 32, female 35 mil. Arizona. Coll. B. Neumoegen, Esq. This species differs by its soft brown color. A fine variety of the female has the s. t. line preceded by a dark brown shade, covering much of the wing.

PERIGEA EPOPEA, Cram.

Since publishing the "New Check List," I have investigated the synonymy of this species. It has received many names, not only owing to

its variability, the bluish-gray shining fore wings being variously deep in color and intruded on by the brown shadings, but on account of its wide habitat. It is migratory, ascending the coast to Maine. I have taken it on Staten Island in October. Mr. Thaxter took it in Jamaica, W. I. It is found along the Gulf Coast. It is No. 478 of the "New Check List."

Its natural history will probably be found to run parallel with other immigrants from the South.

CARNEADES, n. gen.

Like *Agrotis*, but with a navel-shaped tubercle on the clypeus. Tibiæ armed. Eyes naked. Body untufted. Vestiture hairy. Male antennæ sub-simple, ciliate. Size moderate, like *Agrotis campestris*.

CARNEADES MOERENS, n. s.

♂. Of a faded rusty yellowish fuscous. Lines fuscous, double, rather indistinct, scalloped. Stigmata concolorous, the orbicular round, with central dark dot. The reniform indistinct, with an inferior stain. Terminal space a little darker than the wing. Collar with a faint line. Thorax like fore wings. The untufted abdomen yellowish. Hind wings pale, with diffuse pale fuscous subterminal shading; a mesial line. Beneath pale, with common faint line and rather long discal streaks. Arizona. Coll. B. Neumoegen, Esq.

ANARTA SUBMARINA, n. s.

Body untufted. Eyes hairy. Apices of primaries sharp. Tibiæ unarmed. Fore wings pale olivaceous gray. Lines marked doubly in black on costa, but else single, approaching inferiorly; t. a. forming three curves; t. p. dentate. Median shade visible. Stigmata lost. S. t. line obsolete. A very indistinct terminal series of dots. Fringes somewhat fuscous, cut with pale. Hind wings dark, fuscous or blackish, a little paler at base; a mesial line. Head and thorax like fore wings. Beneath whitish with a distinct, extra discal, common line, outside of which is a diffuse subterminal shading continued on both wings. A discal lunule on primaries, wanting, or with hardly a trace of it, on hind wings. Montana. Four specimens. Coll. B. Neumoegen, Esq.

The cut of the wings is different from the other species, costa straight; but it may be placed here for the present.

RHODOSEA, n. g.

Looks like *Heliophila*, allied to *Rhodophora*. Wings entire, wide, costa straight, internal margin parallel, outer margin oblique. Eyes naked, un-

lashed. Front very globose and full between the eyes. Fore tibiae with two terminal claws; the other tibiae sparsely spinose. Body untufted, abdomen exceeding hind wings. Antennae simple. Fore wings vinous pink without marks of any kind, longitudinally shaded.

RHODOSEA JULIA, n. s.

Fore wings pink, the thorax behind and a patch on internal margin at base of primaries pale yellow. A pale yellow streak along the cell. The color appears as if longitudinally laid on in diffuse streaks. Head and thorax in front rosy. Fringes pale. Hind wings whitish, shaded with blackish, beneath white. Fore wings beneath shaded with fuscous, except at apices and terminally, where they are pinkish or pale; the pale streak appears running to margin. *Expanse* 34 mil. No. 975. New Mexico. Prof. Snow.

PHAEGARISTA SEVORSA Grote.

I find that my *Fenaria Sevorsa* is a member of this tropical genus, hitherto undetected in our territory. Our species may be known by the yellow undotted hind wings with their even black border, and the details of the markings of primaries, when compared with the East Indian *P. Transiens*, in which the sexes differ in markings. The single specimen which I had to describe from has the body somewhat flattened by accidental pressure, which assisted my mistake in the location of the insect. It is otherwise bright and fresh. The genus was not known to me in nature previously, and the mistake was an easy one under the circumstances, the species looking much like Lederer's *Chrysaugidia*.

SYNEDA HUDSONICA G. & R.

♂ ♀. Four specimens of this distinct species, the males with a bright brown mesial band on primaries above, are in Mr. Neumoegen's collection from Montana, taken by Mr. Morrison.

MELIPOTIS NIGRESCENS G. & R.

The male of this species is unquestionably *Flavipennis* Harv. The species is perfectly distinct from Hubner's *Fasciolaris*.

MELIPOTIS STYGIALIS Gr.

Two specimens in Mr. Neumoegen's collection vary in size. This species and *M. Sinualis* Harvey may be found to fall in with previously described West Indian forms.

MELIPOTIS VERSABILIS Harvey.

Two specimens in Mr. Neumoegen's collection make me think that

this is distinct and not a variety of *Jucunda*. Both have been accidentally omitted from the "New Check List."

TRICHOCOSMIA, n. gen.

Allied to *Cosmia*, but with hairy eyes. Vestiture flattened hair, mixed with broader scales on thorax, close and short. Wings entire. Abdomen untufted, a little exceeding secondaries. Tibiæ unarmed. Surface of the unlashd eyes covered with short hairs. Clypeus smooth. Palpi rather short. The type is a smaller insect than *Cosmia Orina*, with similarly shaped wings.

TRICHOCOSMIA INORNATA, n. s.

♂ ♀. Fore wings faded reddish ochery, markings obliterate. In the freshest specimens the pale s. t. line may be made out, a rounded t. p. line, somewhat broadly shaded with darker ochery; a stain on median vein. Hind wings pure white above and below, immaculate. Thorax like fore wings. Abdomen white. Arizona. Six examples. In coll. B. Neumoegen, Esq.

CAPIS CURVATA, Grote.

Mrs. C. A. Fernald has kindly sent me a male which I have examined and given all the structural characters possible, but those previously given would allow of the genus being placed next to *Sisyrhyphena* in a synopsis.

BYSSODES OBRUSSATA, Grote.

A well marked male in Mr. Neumoegen's collection from Indian River has the fasciæ bright yellow; on hind wings the red spots reduced and an orange border to the wing, running also outside the metallic band. The color of the common band varies in depth. Veins on secondaries sometimes marked with yellow.

URAPTERYX POLITIA, var. FLORIDATA, n. var.

♂ ♀. Belongs to Guenee's Group 2, but differs in detail from all the species he describes. Primaries and secondaries dark yellow, the former with a small purple costal v-shaped spot, the wings are sparsely speckled with purple, which is gathered into larger patches subterminally and about anal angle. A discal dot. Hind wings with a purple straight line bordered by a small dark spot before anal angle. Beneath the line is repeated more diffusely and above the wing is washed with purplish before line, the color widening to internal margin. *Expanse* 44 mil. Indian River. Coll. B. Neumoegen, Esq.

The colony of tropical insects at the southern extremity of the Floridian Peninsula is one of exceeding interest. The more muscular insects such as Sphingidæ and Noctuidæ seem to be often the same species as the West Indian. There is probably a constant accession of fresh blood. I do not separate the Florida *Edwardsii* of Butler from Cuban *Alope*. But the feebler winged Bombyces and Geometrids seem to differ slightly and seem to have undergone a local modification. My notes on the fauna of the Peninsula are not yet ready for publication, but they show some remarkable results parallel with my already published studies of the distribution of the Lepidoptera.

SCOLECOCAMPA OBSCURA, n. s.

Fore wings ochrey fuscous with an interrupted black terminal line, two dots on the cell and indications of a rounded, bent, single outer median line. Thorax like primaries. Hind wings dark fuscous. Beneath paler, without markings on either wing. Palpi obliquely ascending, fuscous. Antennæ pale. One specimen. Coll. B. Neumoegen, Esq. Arizona. Allied to *Bipuncta*, but darker and stouter.

PHASIANE IRRORATA Pack.

A large specimen of this species, which may be known by the broad pale yellowish median bands, is contained in Mr. Neumoegen's collection from Arizona.

SEMIOTHISA S-SIGNATA Pack.

Arizona specimens vary by the wings being pale ochrey without marks except the black, curved inferior portion of the outer line. Again all marked with dark blotches. The S-shaped black line is more even than in Packard's figure, but I do not think there is room to suspect a different species.

SEMIOTHISA COLORATA, n. s.

This is smaller but in form like *Ocellinata*. No discal mark on fore wings, which show three dark costal spots, the lines obsolete. The wing is washed with faint reddish ochrey. Subterminal line cloudy, blackish continuous, upright, followed by a paler shade. Hind wings light gray, with but little of the warmer tint of primaries; a discal point. Beneath with discal marks on both wings, and with a well marked subterminal band on the whitish secondaries. On fore wings above the terminal space shows an irregular blackish shading. External margin even. Wings sparsely

irrorate. *Expanse* 22 mil. Arizona. Six or eight specimens in coll. B. Neumoegen, Esq.

SEMIOTHISA CALIFORNIATA, Pack.

♀. Mouse gray. Fore wings crossed by three fine brown lines, the outer somewhat flexed and dotted on the veins, deeply marked on costa. Discal dot an annulus on the bent median shade or second line. Hind wings crossed by three lines, the outer broadest and bent, the inner illegible; a solid discal dot above and below. The discal mark on primaries beneath is an annulus. Under surface evenly and somewhat closely mottled with dark. On fore wings above a slight cloud outside of the third line between veins 3 and 4. Body gray. Beneath somewhat ochreous and pale; a common narrow and faint dark outer line angulate below costa and corresponding to the third line of upper surface of primaries. *Expanse* 27 mil. Arizona. Coll. B. Neumoegen, Esq.

I re-describe this fresh specimen to show that, while it varies a little from Dr. Packard's description, and this more in the way of looking at the markings than in anything real, the Californian species really occurs in Arizona.

SEMIOTHISA DISLOCARIA, Pack.

A fine pair of this very distinct and remarkable species is contained in Mr. Neumoegen's collection from Texas. The pectinated ♂ antennæ and the discolorous veins and robust form are distinguishing characters.

PHASIANE NEPTATA, Pack.

This species occurs in Arizona and resembles *Mellistrigata* in the color of the lines. The course of the outer line is different. Mr. Neumoegen's collection.

APATELA VULPINA, n. s.

This is allied to *Leporina* and *Lepusculina* (Populi Riley). The wings are not "d'un blanc grisâtre saupoudré de fins atomes noirs," but of a creamy, yellowish white, not irrorate. The secondaries are not of a "blanc sale," but pure immaculate white. The markings are as in *Leporina*; a black basal dash; the t. a. line consisting of three black spots; a small ringed orbicular sometimes wanting; a small lunate black reniform. T. p. line fragmentary but without the dash at internal angle "en T" of *Lepusculina*, or at most the smallest remnant of it. The markings of these three are alike, but *Vulpina* is slight, like *Leporina* and would have been

placed in a group with it by Gueneé. The larva has been discovered and will be described by Mr. Thaxter. N. Y. (Dr. Bailey.)

HADENA PLUTONIA, n. s.

♂. Allied to *Vultuosa*; very deep almost black brown. A black streak at base on internal margin and black irregular dashes before s. t. line. Lines double, marked on costa, else difficult to make out. Orbicular oblique, concolorous, a little paler, incompletely black-ringed. The wing is of a burnt brown that makes all description difficult by obscuring the markings. Anal hairs ochery. Hind wings fuscous with pale fringes. Beneath the hind wings are paler, ochery towards inner margin: a dot and two extra mesial lines. On fore wings terminal space a little paler. Palpi brown, paler in front. *Expanse* 36 mil. Kelley Point, Maine. Mr. Thaxter.

SPILOSOMA CONGRUA Walker.

This species has at length been discovered. Mr. Thaxter has reared it from the larva. On my first visit to the British Museum I examined Walker's types and made the following description of his specimens:

“♂. Primaries white with a very few sparsely arranged brown dots and an S-shaped subterminal brown line, incompletely drawn across the wing. Abdomen entirely white. ♀. Anterior wings with but one or two exterior dots, almost immaculate white. Secondaries immaculate in either sex. Inwardly the fore coxæ and femora are dark yellow without the black spot sometimes in *S. Virginica*, than which this species seems a little slighter. Beneath the male has faint discal marks wanting in the female. Palpi and antennæ much as in *C. Virginica*. All the tarsi and tibiæ are brown inwardly.”

The species may be distinguished from *Latipennis* by the yellow front legs, and from *Virginica* by the unspotted abdomen. At the time I made these notes I had never seen the species, nor have I seen it until now. I was doubtful about its being North American: But very likely it is a form that Mr. Strecker calls *Antigone*, which must join that author's long list of synonyms.

CARIPETA SUBOCHREARIA, n. s.

Larger than *Divisaria* and deeper in color. Thorax, head and costa of fore wings bright ochraceous. Rest of the wing deep brownish ochrey. Outer mesial band followed by a broad, uneven yellowish white shade. S. t. line dentate, edged with scattered pale scales. Discal spot yellowish white.

rounded. Inner line preceded by yellowish white shading, bent on disk. Fringe checkered. Hind wings brown with lead colored powdering. Fringe marked with dark at end of veins. Beneath pale brown, reflecting markings. Two specimens. Mr. Neumoegen's collection. North Carolina. *Expanse* 35 mil.

ONCOCNEMIS CURVICOLLIS, n. s.

♂ ♀. Eyes naked. Tibiæ with a claw on front pair. Body rather slender. Light gray. Collar a little cut out behind, and projected in front. (This latter character is sometimes accidentally caused; in *C. Occata* I was misled by it to refer the species to *Cleophana*.) No lines. Transverse lines marked on costa. Orbicular with dark gray centre, finely annulate within with pale. The wings show longitudinal light and dark marks. Hind wings whitish in male, with improminent smoky borders in the female, not as dark as *Major*, to which this is allied. Hind wings dark in the female. Thorax dark gray. Stigmata much as in *Major*; in one specimen the claviform contrasts by its pallor. The orbicular seems less sharp. This species seems to differ by the collar being more cut out, the slenderer body, want of any determinate subterminal markings. *O. Curvicollis* is before me in three specimens from Arizona expanding 34 mil.

Neither *Atricollaris* nor its ally, *Griseicollis*, have the collar excavate; *Copihadena* has no character that I can see. Neither has *Metahadena*, which, if the front tibiæ are really armed, as now stated by Mr. Smith, must be referred to *Oncocnemis*. While *Cibalis* and *Gracillina* are allied in marking, *Curvicollis* belongs to the series of *Chandleri*, *Riparia*, *Major* and *Aqualis*. *Pernotata* Gr. shows a faint resemblance to the European *Campicola*. The genus is fairly numerous in species; I should be glad to divide it, but I cannot see on what grounds either of Mr. Morrison's genera are to stand. I relied on Mr. Morrison's diagnosis that the tibiæ were unarmed in referring *Atrifasciata* to *Homohadena*. There is no longer any doubt that *Riparia* is not a variety of *Chandleri*, as which Mr. Morrison described it. We have now three Eastern *Oncocnemis*: *Riparia*, *Saundersiana* and *Atrifasciata*, besides the Texan *Occata*. In all we have 24 species so far described. Most of the types are in the collections of Messrs. Neumoegen, Tepper and Graef. I feel some doubt about the distinctness of *Major* and *Curvicollis*, the latter is slighter and paler, even less distinctly marked subterminally, and the collar is more excavate. *Aqualis*, from California, is also near to these. *Mead-*

ana I do not know except from a view of the type. The rest seem very distinct.

PLAGIOMIMICUS Grote (1873).

The three species which I now refer to this genus agree in the peculiar frontal excavation, the smaller of them (*Tepperi*) showing it less prominently. There is a perfect resemblance in the markings; the position of the lines and the dark triangular spot crowning the subterminal field of primaries above, especially in the form of the thorax and in the peculiarity of the tegulae, which spread away from the thorax and are furnished at tips with elevated scales. In the two larger species (*Pityochromus* and *Expallidus*) the cup-like frontal excavation is completely exposed.

1. *Pityochromus* Grote, Bull. B. S. N. S., 1., 1827, 1873. *Schinia media* Morr., Proc. Bost. S. N. H., 123, 1875.

Southern, Western and Middle States.

2. *Expallidus* Grote. Montana.

3. *Tepperi* Morr., Proc. Ac. N. S. Phil., 68, 1875; Grote, Bull. B. S. N. S., III., 75, 1875.

Texas.

P. Tepperi is a lovely species of a dusky green tinge, and the neat markings show very distinctly against the ground color. Mr. Morrison gives the unarmed fore tibiae as a distinguishing character of *Polenta* as compared with *Schinia*. But the genus is not allied to *Schinia*, but to *Fala* and *Stibadium* and *Stiria*. The characters of the "front" and the tegulae are not noticed by Mr. Morrison, who based his genus on a single erroneous character. The fore tibiae are armed in all the species, not unarmed in *Tepperi*, as stated by Mr. Smith.

CATOCALA SEMIRELICTA Grote.

In Mr. Neumoegen's collection is a specimen exactly like my type and figure and description: the white patches on the primaries, the pinkish red secondaries, the abbreviate black band, are all represented. There is, then, an intermediate specimen in which the fore wings are a little grayer all over, and then the type form described as *Pura*. There is not a shadow of a doubt on my mind, after seeing these, that they all belong to one species. Documentary evidence exists that before its description Mr. Strecker also regarded *Pura* as the same as *Semirelictus*, or very near it. Finally it seems to have been agreed to refer *Semirelictus* as a variety of

Briseis, and then to re-describe its probably more usual form as a new species.

CATOCALA ARIZONÆ.

This has the fore wings more purely brown, a reddish or rusty brown, no yellow admixture. The whole wing is tinted with a brownish shade and there is not the division of colors as in *Junctura*. The hind wings are pinkish red and the abbreviate band *broader* than in *Junctura*. Thus there is a certain resemblance to *Amatrix*, which I alluded to in my original description. Although without figures these differences cannot be brought out in words as they should be, a study of Mr. Neumoegen's fine material will convince any student of the correctness of my separation.

CATOCALA WALSHII.

This species as found in Kansas and Illinois, also in New Mexico, seems to me identical with *Aspasia*. *Arizona* is a larger, rich brown species reared in Arizona by Mr. Doll and probably identical with the Texan form which has been distributed by Belfrage as "*Walshii*." This Texan form is *not* the true *Walshii*, and while it has not received a special name, I regard it as a variety of *Arizona*. Walker's *Junctura*, according to Mr. Butler, is = *Walshii* as taken by Prof. Snow. The statement that *Arizona* was = *Walshii* is based on an erroneous identification of the latter species, which appears to have been named three times.

CATOCALA JUNCTURA Walk.

Fore wings dusky gray, shaded with yellowish brown over the reniform and subterminal space. Base yellowish brown shaded, though often this latter tint is confined to the double t. a. line. The two colors are blended so that there is no distinctness in the shading. The dentate s. t. line includes a paler gray shade. Hind wings pinkish red with the median band rather narrow, abbreviate. *Expanse* 80 mil. Illinois; Ky.; Missouri; Kansas; New Mexico.

With this, *Walshii* W. H. Edwards, and *Aspasia* Strecker, are in my opinion absolutely identical. Types in coll. B. Neumoegen, Esq. Taken by Prof. F. H. Snow.

A form collected by Belfrage in Texas, in Mr. Neumoegen's collection and labelled "*Walshii*," may be a var. of that species. It is larger.

I do not wish to name any more varieties in this genus, but in Mr. Neumoegen's grand collection there are two specimens which seem to me

Junctura, but have gray primaries without darker shades. There is also an unnamed variety of *Verrilliana* with yellow secondaries, from Arizona.

The synonymy of the species here discussed should be as follows :

- 1173 *Junctura Walk.*
Walshii Edw.
Aspasia Streck.
1174 *Arizona Grote.*
1186 *Semirelecta Grote.*
Var. Pura Hulst.

I have *Catocala Violenta* also from New Mexico, collected by Prof. Snow.

(*To be Continued.*)

THE FOOD RELATIONS OF THE CARABIDÆ AND COCCINELLIDÆ. By S. A. FORBES. From Bulletin No. 6, Ill. State Lab. of Nat. Hist., Normal, Ill., Jan., 1883, 8vo., pp. 31.

Through the kindness of the author, we have been favored with a copy of the above paper, which embodies the results of a very laborious series of microscopic examinations of the contents of the alimentary canal of insects belonging to the Carabidæ and Coccinellidæ. In the Carabidæ the results of the dissection and study of 175 specimens are given, representing 38 species and 20 genera. Of the Coccinellidæ, the results of the dissection of 39 specimens are given, accompanied by carefully compiled tables presenting the evidence in the most convenient and accessible forms. Prof. Forbes' experiments show clearly that the opinions hitherto held by Entomologists as to the food of these insects are in many respects incorrect. While it is shown that the insects belonging to the genus *Calosoma* live almost exclusively on animal food, those of *Chlenius* and *Galerita* to the extent of nine-tenths, and those of *Pterostichus* three-fourths; the species of *Harpalus* take only about 12 per cent. of animal food, *Anisodactylus* 21 per cent., *Amara* and *Amphasia* 23 per cent., and *Agonoderus* about 33 per cent.; the whole series of Carabidæ examined averaging 57 per cent. of animal food, the remainder being vegetable and consisting mainly of the pollen of flowers and the spores of fungi.

Of the Coccinellidæ examined, animal food constitutes but little more than one-third of the whole, the other two-thirds consisting of 45 per cent. of the spores of fungi, 4 per cent. of those of lichens, and 14 per cent. of pollen. Prof. Forbes has laid all who are interested in this subject under grateful obligations to him for his valuable contributions to our knowledge in this department.

DESCRIPTION OF THE PREPARATORY STAGES OF PYRAMEIS ATALANTA, LINN.

BY W. H. EDWARDS, COALBURGH, W. VA.

(Continued from Vol. 14, p. 234.)

ON THE LARVAL HABITS.

The habits of these larvæ in Europe may not improbably differ in some respects from the habits in America. Our hot summers, as compared with England, at least, may compel more or less change. With us, speaking of my own district, and of the False Nettle, *Boehmeria*, as the food plant, the eggs I believe to be always laid on the young terminal leaves, as Dr. Harris states is the case with the Nettle, *Urtica*. I come to this conclusion, not because I have found eggs on the terminal leaves, for I do not remember that I have ever found an egg of *Atalanta* laid by a free female; but because the larvæ, in first stage, have always been observed on these leaves. I have repeatedly obtained eggs from females tied in bags over the food plant. On 1st Aug., 1881, upwards of 100 were so obtained. They were laid everywhere, on leaves, stem and bag. When the larvæ hatched, those on the lower leaves made an effort to reach the upper ones, and finding these occupied, accepted any position they could get, turning up the side of a leaf, when necessary. Several lived on the same leaf, each in its own case however. But in a free state, the young larva has always been found by me on the very small terminal leaf, which it has closed up from the base. Dr. Harris says: "*It spins a little web to cover itself, securing the threads all around to the edges of the leaf, so as to bend upwards the sides, and form a kind of trough, in which it remains concealed. One end of the cavity is left open, and through this the caterpillar thrusts its head while feeding.*" This does not properly describe the proceeding on *Boehmeria*. On this the newly hatched larva begins at

the base of the leaf, and spins threads across it. It is not difficult to bring the edges together, as the leaf is but partially opened, the edges being somewhat curled in. Within a few hours, the whole leaf will be found to be stitched in the manner which I will describe at one larval stage later. But an opening is not left at the tip for the larva to thrust out its head; nor does it begin at the tip and eat downward. That would apply to the larva from second moult onward. The young one eats the substance of the leaf within its case, at some distance from the tip, leaving the framework untouched. It makes its resting place quite close to the base, and there it will remain till after it has passed the first moult. The case at this stage is never so eaten that it does not afford protection to the larva, and protection at the youngest stage is most important, as it is then, if ever, that the little ichneumon-fly deposits its egg. The net-work of the frame of the leaf would seem sufficient to keep out many sorts of enemies. Most of the feeding is done at night. At last, some morning, the tenant will be found to have deserted its case, and to have shut itself up in one of the second pair of leaves, and it is now past the first moult. I experimented on several larvæ just past this moult. One was placed on the terminal leaf of a plant set in a flower-pot in my room. A few minutes later, it had descended to the second pair, and taken possession of one of them. Its first movement was to gnaw nearly through the mid-rib quite at the base of the leaf, and also to cut a hole on either side the rib at the break. The leaf was thus made to droop several degrees, and at the same time the sides moved closer together. Then spinning began. Threads were laid obliquely across the open space, one end fastened to the base of the leaf on one side, the other a little above the base. After the edges had been bound for a short distance in this way, a change was made and threads were spun directly across, and over the first ones, beginning at the base. One set of threads drew the edges, the other held them. Then the oblique threads were laid again, and the cross threads, and so on, alternating, till at 90 minutes from the start, sometimes working, sometimes resting, the little creature—.2 inch only—had closed half the length of the leaf. It had also spun some cross threads within, which would help hold the sides in place. Next morning the leaf was completely closed, and to get a view of the larva I had to slit the case with scissors. This was the usual mode at the younger larval stages, only that at the first, on the terminal leaf, the rib was not bitten nor were holes made at the base.

My larvæ displayed much ingenuity, overcoming obstacles, and by no means proceeded always in the same way. Another just past first moult, descended as before to second pair, but instead of breaking the rib to let the leaf fall, set itself to attach threads to the upper leaves *to hold its leaf up*, and then closed the edges. Doubtless it had its sufficient reasons for so building. In this instance, the leaf stood at about 30° above horizontal, in the first, the leaf had been a little below horizontal.

A third larva at same stage proceeded in quite another way. It remained on the terminal leaf, and stitched one edge of it to the near edge of one of second pair; (in this plant the pairs of leaves alternate on the stem, one being at right angles to the other). An hour later, it was stitching the other edge of the other leaf of the second pair. After another hour, it had begun to draw up the tip of its own leaf and at length got this turned over and bound down, shutting itself in a sub-triangular case, very different from the usual one. During the next few days I could discover no trace of this larva having fed, and on the fourth day, it had left its case and closed up a leaf by the edges, after biting off the stem, as related in larva No. 1. At the lower, or tip end as it hung, this case touched the next leaf below perpendicularly, and was stitched to it, and that day and the next the larva fed off the tip of its case, and as fast as eaten this was drawn down to the lower leaf, so that the open end was pretty well closed against the ingress of any enemy. The following day, seeing no change in the eaten parts, I cut the case and found the larva dead, and a cocoon of an ichneumon-fly by its side.

Finally, a fourth larva overcame many troubles in this wise. It was placed on one of the second pairs of leaves, and it closed the edges without biting the mid-rib, until it had gone one-third the length of the leaf, when it returned and broke the mid-rib and also eat the two holes at its base. We may suppose that the larval mind at first decided that the leaf would come together without the rib being broken; and second, discovered that this was a mistake, whereupon rectification was made. At all events, that is what a human architect would have done. After which the larva proceeded to close the rest of the leaf;—all this occupying three hours. Next day I accidentally broke off this case, and pinned it to another leaf. The following morning the wilted case had been deserted, and a fresh leaf was being closed up. A day later this last case fell of itself, but struck a lower leaf, and presently was bound to it by a few threads. Three or four hours later my larva had climbed another stem of the plant, making a

journey of some twelve inches in length, and there it found and closed another leaf. This made three cases by this one small larva. The day after it took possession of the third case, I found it dead, with a cocoon by its side. It would seem as if a premonition of what was to happen impelled these parasitized larvæ to make extraordinary preparations for their final resting places, and I have constantly observed that an unusual amount of spinning had been done, coating the inside of the case thickly, where dead larvæ were found. These cases are closed more carefully than others, so that on inspection it is difficult to find an aperture which would admit anything. I have seen no other parasite about *Atalanta* larvæ than the fly, *Apateles gelechiæ*, and a single cocoon of this, when found, has always rested by the side of a larva of second stage, and no other.

The question may be asked, when does the fly deposit the egg which leads to the destruction of the larva? It is not laid in the egg, for if it was no larva would emerge therefrom. Butterfly eggs are often stung by parasite flies so minute as to be scarcely discernible, and from the egg, a few days later, will issue several similar flies, each about .02 inch long. I apprehend that our larva is stung by this fly just after it has come from the egg, and before it has made for itself a case, for except at this little interval of time, the leaf is closed. And when a hole is eaten in the side, the netting spoken of would apparently suffice to keep out this particular enemy. In the next stage there is no such close protection, and probably not much need of it, for I have not found an *Atalanta* larva infested at any stage after the second. Accordingly, after the first stage there is nothing to screen the holes made in the case, the nerves being eaten as well as the substance of the leaf, and I have never been able to find a web, or threads extended across the opening. When the whole outer end of the case is devoured, as sometimes happens in second and third stages, there is nothing to prevent any enemy entering.

The fly then stings the larva, most likely at the very beginning of the existence of the latter, deposits in the body a single egg, and from that there is hatched a grub which feeds on the fatty portion of the larval interior, avoiding any vital organ, till at the close of the second larval stage it has devoured nearly all but the mere shell, and is itself then full-grown, and eats its way out of the side of the dying larva. Presently this grub has encased itself in a cocoon of its own spinning, a white cylinder, .15 inch long, and there it lies by the remains of the caterpillar, in the tomb

she had spent so much labor upon, and which now serves to protect the cocoon, until, a few days later, a pretty, gauze-winged fly, not much over .1 inch long, comes forth, ready to begin its career of destructiveness.

This is one of Nature's ways of keeping down butterfly caterpillars. But the parasites that aid in this work are themselves kept in check by a similar process. On one occasion I found quite a number of minute flies issuing from one of the *Atalanta* parasite cocoons. They would have been unnoticed but that the cocoon was lying in a closed glass tube. A hole was discovered, as if made by a pin, and through this the flies had come. In this case the secondary parasite must have found its way into the apparently tight case of the caterpillar, and stung the grub of the *Apanteles* just as the latter broke its way out, and while it was yet naked.* I found also a minute red spider inside one of the cases with a grub of the fly, and spiders do their part in keeping down parasites.

But to return to our larvæ. One in 3rd stage; that is, after 2nd moult, very soon closed the large leaf it had been placed on, first biting the mid-rib. This habit of severing the rib obtains quite to the last stage, as is evident from inspection of the deserted cases met with in my searches. Another in same (or 3rd) stage rested for two days under the bit of leaf it was attached to when I pinned it to the plant, making no attempt at a case, but went outside the bit of leaf to feed. The third day it moved up the stem and took possession of a leaf of the second pair, but instead of bringing the edges fully together in the usual way, did so but partially, and twisted the end of the leaf up and over till the case was completely closed.

A larva in 4th stage, *i. e.*, after 3rd moult, began at once to draw the edges together, not having bitten the mid-rib. The case was closed at 11 a. m. By 3 p. m., same day, this larva had constructed a new case, quite capacious and made of three leaves. Before deserting the first one, it had eaten fully half, from the outer end. Next day, it had bitten off the main stem of the plant, just above its case, and had eaten the top leaves. This larva finally, after its 4th moult, left the plant and pupated in the top of the gauze bag, which covered the plant and flower-pot.

I brought in another larva, which had just passed its 3rd moult. After moving about and examining several leaves, at 30 minutes from arrival, it had established itself between two of the second and third pair, which

* Mr. Howard, of the Agricultural Dept., Washington, informs me that this little fly is of the genus *Tetrastichus*, the species probably undescribed.

happened to come near together, the upper one drooping. When I first noticed what was doing, the larva was busy in bringing the edges of the two leaves on one side together. An hour later it had brought both sides together, and soon after eat a large piece out of the lower leaf. Two days later, it had made another case, in this instance also finding and making use of two horizontal leaves. To reach these leaves it had gone down one stem twelve inches and up the other as much. In this last case this larva passed 4th moult. Soon after, I took it out and laid it near the top of the stem, turning up three leaves and pinning the edges of the middle one to the other two, so leaving the upper side open. An hour later, the gap had been closed by bringing the edges of the two outer leaves in, and all the tips were drawn together. A fourth leaf had furnished a meal. Next day the case was spoiled, half eaten up, and the larva had escaped, there being no bag over the plant. But it was recovered and placed in a fresh plant, and soon made a commodious case by bringing three or four of the topmost leaves together. Two days later, it had suspended for pupation from the apex of this case. This is the only instance in which I have known one of these larvæ to pupate on the food-plant.

Another day I brought in one which had passed its 4th (and last) moult. At night it was resting quietly on the stem of the plant, but in the morning was found shut in a roomy case, made by biting the stem near the top, so that it fell over, though it was not separated, and this, with two large leaves, were made into the case. Late that day the case had shrivelled, and the occupant being forced to leave had got on the outside of it. But presently it had brought down another leaf and bound it lengthwise to the case and concealed itself thereunder. One day later pupation was found to have taken place at the top of the bag. The behaviour of this larva partly agrees with what Newman relates, so far as to the biting off the stem and making a large case, and had not this shrivelled, perhaps the pupa would have been formed within it. In my searches, I came on one full-grown larva concealed in exactly such a case as I have just described, and had to regret afterwards that I had not tied a bag over it, in order to see whether pupation occurred in the case or not. But, except in this one instance, I have never seen that sort of a case, nor have I ever found a chrysalis suspended to the food plant, in or out of a case. Surely I would have found chrysalids on the food plant if it was usual for the larvæ to pupate where they fed! Dr. Harris must be right when he says that the larva "searches for a place in which to transform." Very probably Mr.

Newman is right also when he says that in England pupation occurs in the cases, on the food-plant; and the difference is caused by climate.

I constantly came upon empty cases one-half and two-thirds eaten, and it is plain that the larva in its later stages may occupy and devour two or three per day.

The summing up of these observations is this: the young larva, when on *Boehmeria*, conceals itself very soon after it has left the egg, by bringing the edges of its leaf together. It does not now go outside to feed, but eats of the substance of the leaf, rejecting the framework. Here it remains till after the first moult, and then migrates to a larger leaf and closes the edges of it, after biting nearly in two the midrib and cutting two holes at base, to cause the leaf to droop and the sides to come together more easily. It feeds inside the case, at some distance from the tip end, and its resting place is near the base. Here the second moult passes, and that over, another move is made, rendered necessary by the case having been much eaten. After the third moult, and usually not before, the end of the case is devoured, beginning at the tip, and thenceforward there is no special protection to the larva against parasites or enemies. Finally, after having built, occupied, and half devoured several cases, the larva goes away from the food plant to pupate.

The one occupation of the larval life is to secure privacy, in the early stages, with a prevision of nasty flies and spiders, and in all stages, with a detestation of sunshine, daylight and bad weather; and to effect this they labor long and industriously. Their cases once made, they may enjoy a rest, and lie curled up and asleep probably, except when impelled by hunger to arouse themselves. And they do not have to forage for a meal as most animals do, but may devour of the walls of the houses they live in. When there comes an end to this supply, they set forth to find suitable leaves, out of which they shall construct other houses, to be eaten in like manner. Even though they occupy these but an hour or two, and they serve for but one hearty meal, they must be closed up as if a month's residence was anticipated.

We have no other butterfly in our fauna whose caterpillar has a habit quite like that of *Atalanta*; *Paphia Troglodyta* Fab. (*Glycerium* Edw. But.) would seem to come nearest to it. Some of the Graptas make shelters in the nature of sun-screens or umbrellas, as *G. Comma* and *G. Satyrus*, not intended probably as a protection against enemies.

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No. 2

DESCRIPTIONS OF A FEW LEAF-EATING COLEOPTEROUS LARVÆ.

BY D. W. COQUILLETT, WOODSTOCK, ILL.

The following larvæ (with the exception of the one first described) have the usual *Chrysomelid* form of which the well-known Colorado Potato Beetle may be taken as a type. In *Chrysomela pallida*, Say, the body is more elongate, approaching the *Coccinellidæ* somewhat in form. With the exception of *Lema collaris*, Say, which forms a sort of cocoon among the leaves, they all enter the earth to pupate. A few of the following larvæ have been described by various authors, and are introduced here merely for comparison.

CHRYSOMELA PALLIDA, Say. Body black, elongated, much wrinkled and roughened; the sutures of the segments and the venter sometimes tinged with brown; head and cervical shield polished black; length 8 mm. Lives in communities on poplar. Several of these larvæ entered the earth to pupate June 1st, and the beetles issued about June 19th. (Determination of Dr. Horn.)

CHRYSOMELA CLIVICOLLIS, Kirby. Body pale, flesh-colored, on each side of the body is one row of 8 black dots; cervical shield dark brown; head a little lighter than the body, marked on each side with two black dots; length 11 mm. Lives on *Asclepias*. Several which I found on *Asclepias Sullivantii* July 19th, entered the earth July 23, and the beetles appeared about August 9; another specimen issued from the pupa July 25. Two were taken *in coitu* June 19; the male was the smallest and darkest, and had only one black spot at the tip of each elytron, while in the female this was divided into two spots.

DORYPHORA 10-LINEATA, Say. Body dark pinkish or yellowish flesh; on each side of the body are three rows of black dots, the upper row not extending upon segments two and three; the dots in the lowest row are

much smaller than those in the other rows ; cervical shield color of body, bordered behind with black ; head black ; length 10 mm.

DORYPHORA JUNCTA, Germar. Body pale, yellowish flesh color ; on each side of the body is one row of eleven black dots ; cervical shield dusky, broadly edged all around with black ; head pale ; length 10 mm. Feeds on *Solanum Carolinense*. (From Riley in Amer. Ent. vol 1, p. 43.)

CHRYSOMELA MULTIGULTIS, Stal. Body dull white ; a dark colored dorsal line on which is a row of brown spots ; on each side of the body are two rows of brown spots ; head yellowish brown, marked with a black spot on each side ; length 10 mm. Feeds on Hazel. Found several July 4th ; these were bred to the perfect state, but I neglected to note the date when the beetles issued. I have taken the beetles *in coitu* June 13th. (Determination of Mr. E. P. Austin.)

CHRYSOMELA BIGSBYANA, Kirby. Body white, tinged with yellow ; spiracles black with a white dot in the centre of each ; on each side of segments 2 and 3 is a curved black dash, the curve downwards ; cervical shield concolorous, marked with a blackish spot in the middle of each outer edge ; head yellowish brown, ocelli black, in two clusters ; length 10 mm. Feeds on Willow. Found two, August 13 ; these pupated shortly afterward, and the beetles issued Sept. 5th. (Determination of Dr. Horn.)

CHRYSOMELA SIMILIS, Rogers. Body whitish, mottled with green and yellow ; spiracles brown or black ; head pale yellowish brown, ocelli black ; length 7 mm. Lives on *Ambrosia artemisiaefolia* and *Bidens frondosa*. Found June 12, July 21, and August 22 ; those taken July 21 pupated July 31, and the beetles issued August 5. I have seen the beetles *in coitu* July 22nd and August 2. (Determination of Mr. E. P. Austin.)

LEMA COLLARIS, Say. Body pale yellowish white ; spiracles brown ; cervical shield brownish black, or marked with blackish ; head black, clypeus sometimes tinged with yellow ; length 5 mm. Lives on Thistle (*Cirsium lanceolatum*), and feeds mostly on the under side of the leaf, sometimes burrowing between the upper and lower cuticle, always leaving the former untouched. When fully grown they spin an irregular cocoon which somewhat resembles the frothy mass of a spittle-insect, the outside being in small, irregular, oblong pieces, somewhat resembling

small *Microgaster* cocoons. Several which I found on the 8th of July constructed their cocoons July 12th and the perfect insects issued about July 25. (Determination of Dr. Horn.)

NEW SPECIES AND NOTES ON STRUCTURE OF MOTHS AND GENERA.

BY A. R. GROTE, A. M.

(Continued from Vol. xv., Page 13.)

CATOCALA COELEBS Gr.

The fore wings are *black* with a grayish white subterminal shade. A strongly marked variety of *Badia* with the fore wings *brown*, was mistaken for *Coelebs* by Mr. Strecker, and was the occasion of its reference to *Badia*. But a sight of many specimens leads me to believe that the true *C. Coelebs*, with black fore wings, grades into *Badia*, and is only to be regarded as a variety of it. But this could not have been predicated of the type. The two extremes are exceedingly distinct and different looking.

EXENTERELLA Grote.

I propose this generic term for *Exentera* Gr., preoccupied in Insecta. Now that we have Mr. Scudder's work on genera, there will be more certainty about generic names. I notice that *Rhododipsa* is not included in Mr. Scudder's list. In speaking of the omissions in my review of it, I did not intend that any idea of purposed favoritism should be conveyed by my words. I merely regretted that some authors should have been so fully and others so sparingly represented. Had the proof of my paper been sent to me, I think I should have changed the wording to a simple expression of this regret.

HEMILEUCA Walk.

Since examining the species carefully, as far as they are accessible, the following modification of my arrangement in the "New Check List," p. 20, is proposed:

Genus HEMILEUCA Walk.

Type: *Bombyx Maia* Drury.§ *Eucronia* Pack.*Maia* Drury.Var. *Nevadensis* Stretch.*Grotei* Hopffer.*Juno* Pack. —*Diana* Pack. —§ *Euleucophaeus* Pack.*Yavapai* Neum.*Tricolor* Pack.*Sororius* Hy. Edw. —

Genus ARGYRAUGES Gr.

Type: *Euleuc. Neumoegeni* Hy. Edw.*Neumoegeni* Hy. Edw.

In the foregoing list the sign — indicates that I have not examined the species.

TORNOS EUPETHECIARIA, n. s.

Male and female. Very small, light, whitish gray. Male antennæ pectinate; female simple. Faint discal mark on primaries, which have a subterminal shade line and traces of others, very faint. Secondaries whitish, marked on internal margin, with fine black terminal line and white fringe. Beneath whitish with faint discal mark on primaries. *Expause*, male, 17 mil.; female, 16 mil. The female is more gray and fainter marked. Arizona.

TORNOS PYGMEOLARIA.

Male and female. Blackish gray; lines and dots almost imperceptible. Hind wings fuscous with white fringes. Beneath pale with faint discal dots on both wings. The female has the disk of secondaries paler and the discal dots on both wings more evident. Arizona. *Expause*, male 18 mil., female 19 mil.

These small Geometrids may be known from their inconspicuous markings, and by the pectinate male antennæ may be separated from small *Eupethecia*, which they resemble. I have taken *Tornos* in Alabama; the abdomen is curled up over the thorax in repose. *T. Escaria*, female, expands 30 mil., and another female 28 mil.; the male 26 mil. Several

specimens of *T. Interruptaria*, female, expand from 26 to 30 mil. *T. Ochrofuscaria*, female, expands 25 mil. Besides these, a number of specimens in Mr. Neumoegen's collection seem intermediate between *T. Escaria* and *T. Pygmeolaria*, but I hesitate at present to describe them.

TETRACIS VIDULARIA, Grote.

Two female specimens in Mr. Neumoegen's collection are more brown speckled about apical region and smaller than the two typical female individuals. The male has not yet appeared in collections. This is congeneric with *Coloradaria*.

THAMNONOMIA PERPALLIDARIA Grote.

A second male from Arizona is of a more reddish, deeper color than my type from New Mexico. The species may be known by the feathered antennae and the two ochre brown straight lines on primaries arising from blackish costal dots and the fragmentary s. t. line, inclining inwards.

AZENIA EDENTATA, n. s.

Male. The infra-clypeal plate prominent. Above it a broad, frontal, projected plate, the outer edge of which is roundedly scalloped instead of forming three sharp teeth as in *A. Implora*. As my type of *Implora* is a female, I thought at first I had to do with a secondary sexual character which on other grounds seems improbable. The thick labial palpi lie obliquely along the face, hardly exceeding the clypeal projection. Fore wings dark yellow. There seems to be no marks but a small costal dot; fringe concolorous. Hind wings fuscous. Beneath yellowish; fore wings shaded and with a fuscous subterminal band. Thorax and head dark yellow; abdomen pale. Size small like its congener. Arizona. Coll. B. Neumoegen, Esq.

ONCOCNEMIS PERNOTATA, n. s.

Allied to *Saundersiana*; base of primaries washed with light gray; t. a. line double, even, dark brown, slightly curved. Orbicular and reniform subequal, completely defined, gray, with central mark; claviform solid, black. T. p. line double, a little uneven, running inwardly and nearing t. a. line on internal margin. S. t. line wanting. Veins marked with black terminally. Median and subterminal fields washed with light gray; terminally the wing is brownish. Collar light yellowish gray; head darker. Fore tibiae armed with a claw. Eyes naked. Hind wings with

broad diffuse blackish border and white interlined fringe. Beneath slightly yellowish with broad borders to both wings. A dot and fragmentary inner mesial line on hind wings. Thorax gray; abdomen yellowish gray. Arizona. Coll. B. Neumoegen, Esq. Distantly resembles the European *Campicola*; very distinct from any species described by me.

AGROTIS CITRICOLOR, Grote.

Agrees with types of *Citricolor*, but the markings are distinct; the colors are pale yellow, somewhat ochrey on the thorax, and the terminal space is fuscous, the fringes a little reddish or brownish. Median lines faint, pale fuscous, the t. a. single, very faint, the t. p. apparently single, denticulate. Orbicular hardly noticeable; reniform moderate, pale blackish or fuscous; s. t. line pale; terminal space narrow, blackish or fuscous; fringes whitish or tinged with brownish. Hind wings pure white. Beneath white; costæ yellowish; faint traces of spots and lines. Oak Creek Canon, Colorado; Coll. J. Doll. In Coll. B. Neumoegen, Esq.

Is apparently not different from *Citricolor*, but the terminal space is not "brownish," but fuscous, without any warm tint, and the lines are distinct. The species is somewhat variable, I take it, in the amount of markings expressed, and there is no room for the erection of a second yellow *Agrotis* at the expense of *Citricolor*. It has a frontal tubercle and I refer the moth to *Carneades*, it being congeneric with *C. moerens*.

AGROTIS MUSCOSA, n. s.

Female. Form rather stout. Fore wings of an even smooth gray with an ochre tinge. Markings obsolete. Median shade distinct ochre brownish. Stigmata concolorous; reniform with a blackish inferior stain. Lines double, marked on costa by small black dots. Abdomen whitish, marked with ochre-brown at tip. Collar and thorax tinged with ochre-brown. This species must not be confounded with any of the forms of *Auxiliaris*, which it approaches somewhat; it is not so large, and appears stouter, with a resemblance to the *Lubricans* group. Oak Creek Canon, Colorado, J. Doll legit. In Coll. B. Neumoegen, Esq.

PLUSIA EGENA Guen.

This species must be added to our fauna. Mr. Neumoegen and Mr. Hy. Edwards have received it from Indian River, Florida. Gueneé describes it from Brazil. Our specimens are hardly "d'un carné rosé," so far as the ground color is concerned, but pale rosy brown. Some of our Plusias are widely distributed: according to Berg *P. Biloba* is found also in Chili.

TETRACIS SIMPLICIARIA, n. s.

Size rather small for this genus. Fore wings pale reddish ochrey, entirely evenly colored, crossed by two median pale yellow lines, inner a little curved, outer slightly bent. Costal edge yellow with faint speckles. No darker marginal line. A minute discal dot. Hind wings whitish with a broad vague outer yellowish shading, fringes paler; no marginal line or any marks on internal margin. Male antennæ slightly pectinate. Thorax like fore wings; these latter beneath reflect markings of upper surface. Apices pointed, below them the margin is incurved to vein 4, where the external angle is well produced. *Expanse* 30-31 mil. Arizona, J. Doll. New Mexico, Prof. Snow.

CHESIAS FRONDARIA Grote.

Too late to make the correction in print, I found that this was our first discovered species belonging to this genus; our species is larger and its resemblance to the European did not strike me. The genus is not found either in California or the East. The fauna of Arizona and New Mexico contains representatives of European genera not found elsewhere. Dr. Packard's *Chesias Occidentaliata* was wrongly determined generically, and the moth proves to be *Eupethecia Subapicata* of Gueneé.

FIDONIA ALTERNARIA, n. s.

♂. Orange brown above; the primaries crossed by three fuscous bands; the inner continuous over the cell at about middle of wing; the two outer broader, brought into relief on costa by the whitish yellow ground color which there obtains between them. Hind wings with a very indistinct basal line continuous with inner line of primaries; a narrow line continuous with second line; a broad band continuous with third line and a marginal series of brown marks. Beneath fore wings orange with the three bands distinctly repeated; margin brown; ante-marginal space and costal region at apex white. Hind wings white with three broad brown bands and terminal brown marks; the ground color distinctly and almost equally broadly obtains between the bands. *Expanse* 22 mil. New Mexico. No. 1,024.

This is allied to *Stalachtaria*, but differs by the equal alternating white and brown bands of under surface of secondaries, the continuous line of fore wings above over middle of wing and the less deeply marked and more separate outer bands.

FERALIA JOCOSA Guen.

♀. Not until now have I seen the female. The narrowed, naked, lashed, compound eyes distinguish this from *Momophana Comstocki*. It is not possible to consider *Momophana* and *Feralia* identical. The larger eyes, smoother vestiture, less retracted head and broader clypeus sufficiently distinguish *Momophana*. As to *Comstocki*, I was wrong to suggest that Guenee's var. of *Jocosa* was probably *Comstocki*. I did not know then the variability of *Jocosa*. I have sufficiently explained that *Diphthera* is a Hubnerian name proposed originally in the same sense as *Moma* has been used. I have restricted *Moma* to *M. Astur* Hubn. Verz., and restored its original significance to *Diphthera*, where it embraces *D. Fallax* H.-S.

Antennæ simple. Beneath tinted with green. Hind wings with mesial black lines including a black lunate discal spot; a subterminal blackish shade on costal region. The rough vestiture, sunken head, short palpi distinguish *Feralia*.

A specimen from Mrs. Fernald, defective and faded, leads me to suspect a second species. *M. Comstocki* seems very rare, and I cannot again go over the characters from fresh specimens; but the genus is valid unless we consider it as a group of *Diphthera* (in sensu mihi), which I am not as yet prepared to do.

MAMESTRA SPICULOSA, n. s.

Allied to *Cinnabarina* and *Herbimacula*. Fore wings light brown, with the median vein, the t. p. line and stigmata finely marked in white. Cell shaded with black; a black spot below median vein on median space. A pale greenish shade on internal margin subterminally; outer edge dark, cut by the fine pale irregular s. t. line. T. p. line angulate opposite cell. Orbicular oblique, small, a white ring with dark centre; reniform very narrow, upright. Hind wings white. Body brown. Two specimens. *Expanse* 25 mil. Arizona. Coll. B. Neumoegen, Esq.

HOMOHADENA INCONSTANS, n. s.

♂ ♀. An obscure fuscous gray species with naked, lashed eyes; third palpal joint small; female ovipositor visible. Size and appearance of *Induta*, but with the look of an *Agrotis* belonging to the *Sileus* or *Lagena* group. Transverse lines all lost; stigmata wanting. In the female the veins are marked with black, the median vein most decidedly so. In the male there are no marks. The head is smoky and the collar paler. Hind

wings fuscous, paler at base and paler in the male; the veins soiled. Beneath pale and without markings; there is a faint indication of a common line which appears dotted on hind wings of male. Arizona. Three specimens. Coll. B. Neumoegen, Esq.

HOMOHADENA VULNEREA, n. s.

♀. Eyes naked, lashed. Tibiæ unarmed. Fore wings light brown. T. a. line obsolete; t. p. line black, single, well removed outwardly; three black median costal dots. A black dash at base below median vein. Stigmata very small, inconspicuous, pale; a black dash on cell on each side of the orbicular. Veins finely black at extremity, else tending to be pale. Fringes checkered. Thorax like fore wings. Hind wings pure white. Beneath with only a common dotted exterior line. Arizona. Coll. B. Neumoegen, Esq. Two specimens.

This species is very simply marked. The eyes are plainly lashed, but in the type of the genus, *H. badistriga*, after renewed examination, I am not certain that they are, though I incline to regard them lashed.

MAMESTRA FERREALIS, n. s.

Allied to *Mamestra Cinnabarina*, var. *Ferrea*, but larger. Bright brown. Orbicular circular, bright brown, with central dot. Reniform upright, very slightly medially constricted, with a central line hooked into two dots. T. p. line double, black, with white included shade. Subterminal space washed with whitish, leaving a brown patch at costa. Terminal space narrow, brown at apex, afterwards blackish. Subterminal line whitish, preceded by a narrow brown shading. A blackish shade between the stigmata on cell. A blackish shade on costa over sub-basal space. Basal half-line white. A broad shade submedially across median space, deepening before t. p. line, where it is cut by the brown median shade. Hind wings fuscous, with extra-mesial line. Beneath primaries purply brown with a black costal shade outside of the common extra-mesial line. Thorax rather pale, collar and tegulæ with black lines. Abdomen tufted, reddish fuscous, somewhat brighter beneath. Montana. Mr. H. K. Morrison.

Expanse of Noctuidæ.

The following measurements have been omitted in my late descriptions:

Fota armata, 32 mil.

“ *minorata*, 24 mil.

Fotella notalis, 28 mil.

Oxycnemis advena, 21 mil.

HEPIALUS FURCATUS.

Dark sable brown. A broad submarginal band furcate below apices and continued irregularly along internal margin, paler than the rest of the wing, variable in width, edged with dark, almost black scales, and with a blackish marginal submedian shade spot. Two or three pale marks on costa within the short inner branch of the band, which is not interrupted, and, the fringes of secondaries being checkered, divides this form from Dr. Packard's *Labradoriensis*, unknown to me. Fringe of both wings checkered with pale. Hind wings uniform pale sable brown with two marks on costa, which may indicate transverse bands. Body dark sable brown. Size of *H. Gracilis*, but much darker. Four specimens agree very nearly. On primaries, the external margin and the middle of the wing are more distinctly warm brown, and on the disc are traces of an incomplete inner transverse band. One specimen (a ♀ ?) is a little larger with the subterminal band very wide. Beneath the subterminal band is partly reflected. Mr. Hill. Adirondacks.

MEGACHYTA INCONSPICUALIS, n. s.

A little smaller than *Deceptricalis* and darker. Fuscous gray shaded outwardly with blackish. Inner line single, uneven, arising from a hardly accentuated black costal mark. Outer line denticulate, merely rather gradually widening to costa. S. t. line upright, pale, very fine; a discal dot. Hind wings like primaries with two extra mesial pale-shaded lines, the inner indistinct, the outer with the following pale shade more apparent at anal angle, as in its ally. This species is smaller and darker than *Deceptricalis*, with the median lines hardly accentuated on costa, especially is this latter character true of the inner line, which is more irregular. Two specimens. Mr. Hill. Adirondacks.

ARSILONCHE HENRICI.

I have again examined four specimens of *Alborensa*. We have the species united by Mr. Morrison solely on Dr. Staudinger's authority, and that Dr. Staudinger is not difficult in such matters is shown by his reference of our *Grapte* as varieties of the European species. The dark shades are darker and look quite different in *Alborensa*. I never saw any *Henrici* (and I have seen I should think a hundred) look like them. *Henrici* I took three or four of on Staten Island in 1881, and again two this year at light. Also one *Absidum*, which seems to me cannot be a mere variety. It differs less than many varieties, but it has more char-

acters. It is not unlikely then that Mr. Smith's Canadian correspondents, whose mistakes he has drawn attention to in the CANADIAN ENTOMOLOGIST, are really more correct in calling the species *Henrici*, but the genus *Able-okorna* must be withdrawn. I have found that my Canadian correspondents were always careful and well-informed, and I must say that, so far as the *Noctuidæ* are concerned, that there is more accurate knowledge generally distributed than in any of the other of the larger groups of moths.

SALIA RUFA, n. s.

Primaries brownish gray crossed by three oblique, yellowish, narrow lines. Inner line with a costal projection. The first discal dot is close to it. The middle line is a little waved and followed by a diffuse black shading, which obscures the outer discal dot. The outer line is a little bent at the middle and loses itself to apex. The subterminal field which follows is suffused with reddish brown and limited by a very fine irregular line; terminally the wing is again brownish gray and shows a faint festooned line; fringes paler, a little brownish. Hind wings fuscous gray with brownish fringes, beneath with black discal dot and outer line, the surface paler, irrorate. Arizona. Coll. B. Neumoegen, Esq. *Expanse* 22 mil.

Differs in color from our Eastern *S. Interpuncta* Grote, but of about the same size. *Mudopa*, signifying "bald face," and not appropriate, is younger than Hübner's names, as stated by Zeller; and *Salia* is the oldest.

Twenty-five years ago, in my sixteenth year, I commenced the serious study of our nocturnal Lepidoptera. At that time probably not more than fifty kinds were named in any of our public or private collections. Now, of the one family *Noctuidæ*, alone, we have over sixteen hundred species recorded in our books. To my early letters requesting information for myself, I received no satisfactory replies; instead, boxes of specimens were sent to me to name. I am happy that some of my first correspondents still consult me, and that friendly relations exist between myself and almost all the students who have asked for my services.

NOTES ON THE EARLY STAGES OF XYLOTRECHUS
ANNOSUS, SAY.

BY D. W. COQUILLET.

In the month of April, 1880, I cut down a willow tree and cut it up into "sled-lengths," when no traces of borers could be seen. Early in March of the following year, while cutting this wood for the stove, I

found it to be infested with the larvæ of some species of longicorn beetle ; I placed some of the sticks in one of my breeding cages where it remained undisturbed until the 7th of May following, when I found that nearly all the larvæ had assumed the pupa form. The next examination was made two weeks later, when nothing but perfect beetles were found. From this it would seem that this species requires only one year to complete its transformations.

I am indebted to Dr. Horn for determining the above species.

DESCRIPTIONS OF NEW SPECIES OF DIURNAL LEPIDOPTERA,
FOUND IN BRITISH AMERICA AND THE
UNITED STATES.

BY W. H. EDWARDS, COALBURGH, W. VA.

ARGYNNIS BUTLERI.

Allied to *A. Chariclea*.

Male.—Expands 1.4 inch.

Upper side dark fulvous, the base of primaries largely black, of secondaries still more, the black area extending to middle of disk, effacing all markings ; the spots of both wings outside the basal area as in *Chariclea*, but the narrow spots on primaries are unusually large, with ragged edges, and the mesial band is heavy and diffused ; on secondaries this band is lost in the black ground.

Under side of primaries nearly as in *Chariclea*, but there is scarcely any yellow at apex or along hind margin, all this area being deep red ; a few yellow scales only at apex and in middle of the marginal interspaces, to represent the spots and patches of *Chariclea* ; the submarginal lunules almost lost in the red ground.

Secondaries deep red, there being no yellow on the extra-discal area ; the submarginal lunules and the rounded spots lost in the red ground or very obscurely indicated ; the light band which limits the basal area is of same shape as in *Chariclea*, but is nearly covered with red, the long triangle at end of cell, and the rhomboid on costa, alone being white ; from this band to base the color is intense red, with a few white scales in the interspaces at base ; the macular silvery line around hind margin as in *Chariclea*.

Female.—Expands 1.5 inch.

Similar to the male, the basal areas black, but the spots still more diffused.

Under side as in the male, but there is a little more yellow at apex, and in the interspaces along hind margin are streaks of yellow. Secondaries intense red from base nearly to the rounded spots, and the edge there is fringed with clear white scales next costa, and white mixed with bluish or slate-colored on posterior half; these dark scales edge the nervules nearly to margin; the extra-discal area is same red, but over a yellow ground, the yellow nowhere distinctly appearing; the round spots and the submarginal lunules same red as the base; the silvery line as in male.

From 1 ♂ taken at Cape Thompson, North-west America, July 19, 1881, and 1 ♀ taken at Kotzebue Sound, July 14th, 1881, by Mr. E. W. Nelson, of the U. S. Signal Service.

These examples differing markedly from any *Argynnis* in my collection, I sent the male to Mr. A. G. Butler for determination. Mr. Butler replied: "It differs from *Chariclea* in the redder coloration, and much heavier markings on the upper surface; the basal area is blacker, the spots and stripes much thicker. Below, the markings are altogether darker than in *Chariclea* of Europe. Your example agrees perfectly with a specimen (in Br. Mus. Col.), labelled Nova Zembla, and with two of the Grinnell Land series, included under Mr. McLachlan's varieties of *Chariclea*. It is in my opinion worthy of a distinct name."

I take pleasure in naming the species after Mr. Butler.

ARGYNNIS EURYNOME Edw.

VAR. ERINNA.

Upper side in both sexes like the type form; on under side secondaries much covered with dark ferruginous, and sometimes even the belt between the outer rows of silver spots is more or less densely covered with same. In one ♀, except for a paler shade in the interspaces (but still ferruginous) on the area of this belt, the entire wing would be solid ferruginous, very little mottled with yellow buff on basal part of the disk. One male is nearly as dark. Others, of both sexes, are more or less mottled with yellow buff, and the belt is of that color, clear. There is an absence of green (olive) in all examples under view. If it were not that among these are some exactly like examples from Colorado, without green, I should consider the present as a distinct species. I have 12 ♂, 4 ♀ from

Spokane Falls, W. T., sent me by Rev. W. J. Holland, Pittsburgh, Pa.; and 1 ♂ taken in Colorado by Mr. Mead in 1871. Also I have a female nearer the Colorado type of *Eurynome*, by Mr. Morrison, at Mt. Hood, Oregon. This is very small, dull fulvous above; the belt spoken of dark yellow buff, the disk to base pale ferruginous, mottled with dull green. Two females from Big Horn, Mont., agree with this, but are large as the usual Colorado form.

PAMPHILA CARUS.

Male.—Expands 1.1 inch.

Upper side light brown, with a slight tint of yellow; primaries have two minute yellow white sub-apical spots on costa, two others directly below these in the two upper median interspaces, and an obscure spot at outer end of cell; the stigma a straight, slender black bar, extending from upper median nervule to sub-median. Secondaries have, on the disk, in line parallel to hind margin, a curved row of obscure and minute yellow-white spots on the upper half the wing; fringes dull white.

Under side of both wings brown; the costal margin of primaries and inner margins of both wings, dusted with yellow-white: so also the hind margins for a narrow space; all nervures and branches yellowish; primaries have the spots of upper side repeated, enlarged; there are now three costal spots, two at end of cell, two in median interspaces, and one in cell; on secondaries the row is distinct, all the spots enlarged, the line curving round outer angle; a large spot in cell.

Female.—Expands from 1.1 to 1.25 inch.

The upper side marked by an oblique row of white spots extending from upper discoidal nervule to inner margin; three costo sub-apical spots; one at end of cell; the spots on secondaries distinct.

From 1 male and 2 females received some years ago from the late Jacob Boll, and taken by him in West Texas. The species stands near *Rhesus* Edw., resembling it in size, general color of upper side and white fringes. But the male *Rhesus* has no stigma, the fringes are purer white, and there is considerable difference beneath. The presence of a stigma however is enough to enable one to distinguish *Carus* at sight.

PAMPHILA MILO.

Male.—Expands 1.2 inch.

Upper side bright red-fulvous, the hind margins of primaries pale brown nearly to cell; the stigma a black narrow ridge, nearly straight, bent

down a little towards outer end, edged on both sides by black scales; on costal margin three small translucent spots, and two next stigma on the two median interspaces; no black spot or patch beyond stigma towards apex. Secondaries have a narrow and darker brown margin, and all the disk and basal region is bright fulvous.

Under side of primaries pale ferruginous; the translucent spots repeated, not enlarged; a black mark indicating the outer end of stigma, and black next base. Secondaries paler ferruginous, the disk a shade lighter than the margin.

From 1 male, from Mt. Hood, Oregon. Near *Agricola* Bd.; same size; the fore wing less produced: stigma same shape, but there is no dark patch beyond it; the translucent spots are not found in *Agricola*: below paler colored, and no black at inner margin of primaries.

PAPHIA MORRISONII.

Male.—Expands 2.7 inches.

Primaries scarcely at all produced, the hind margin but little concave.

Upper side bright red, with no spots or marks, except that the arc of cell on primaries is narrowly edged on both sides by brown scales; apex and the edge only of hind margin dusted lightly with black. Secondaries have the costal margin whitish or hoary; the hind margin dusted with black and very scantily for about two tenths inch inward, scarcely obscuring the red ground; mixed with the black on the marginal edge, especially between the tail and inner angle, are dull gray scales; near the margin, a complete series of yellow points, one on each interspace; tail short, spatulate.

Under side gray-white, dusted thickly and quite evenly with pale black, though rather less on the marginal areas; the inner half of primaries red-tinted; primaries have no bands or spots; secondaries have a narrow nebulous stripe across the disk limiting the slightly darker area to base.

Body reddish above, thorax light gray-brown beneath, abdomen yellow-white; legs yellowish; palpi yellowish, with brown hairs at and near tip; antennæ brown, imperfectly annulated with gray; club black, tip ferruginous.

Female.—Expands 2.3 to 2.75 inches.

Primaries more produced, the apex ending in a sharp point.

Upper side dark red; costal margin of primaries narrowly edged with brown; apex of same wing and hind margins of both wings bordered with

pale black, more narrowly than in *P. Troglodyta*; preceding this is a band, sometimes of a paler red than the ground, sometimes of same shade, and only imperfectly indicated by the brown indistinctly defined line which limits its basal side: this band is shaped much as in *Troglodyta*, but comes considerably nearer to hind margin, thereby restricting the width of the dark border, and also of the dark apical area, and is less incurved on the median interspaces; on the arc of cell a narrow black crescent; on the outer half of secondaries is an obscure continuation of this band, which passes imperceptibly into the ground color; the yellow points are continued across both wings. Under side same shade as in the male, the basal and discal areas on primaries darker than the marginal.

From one male, from Western Texas, in the collection of Mr. B. Neumoegen, and 3 females, taken by Mr. Morrison, on Mt. Graham, Arizona. The male is brighter red than *Troglodyta* Fab. (*Glycerium* Edw., not Doubleday, *Andria* Scud.); the wings of purer color, with scarcely any black margins. In the example under view, the discal spot is brown and obscure, instead of black. The female has a marginal border not half the width of that of *Troglodyta*, and the obscure band, not always paler than or differing from the ground, follows more closely the margin. Both sexes have yellow dots in the interspaces near the margins on hind wings, and the female on fore wings also. The under side is gray-white, instead of a greasy gray-brown, and there is almost an entire absence of markings. I sent one of these females to Mr. A. G. Butler, together with one of the Illinois and Western species. Mr. Butler replied that there was nothing in the Museum collection like this Arizona example, nor did he know of anything of the kind having been described. I name it for Mr. Morrison, whose arduous labors have so greatly enriched the American collections.

With regard to the Illinois species, Mr. Butler pronounces it *Troglodyta* Fab., a conclusion to which I had myself come, after an examination of Cramer's figure of *Astinax*, last fall in Philadelphia, at the Academy. It seemed to me that the figures of Cramer were unmistakable. The synonymy of the species then is:

P. TROGLODYTA Fab., Syst. Ent., 502, 1775.

Astinax Cramer, iv., 337, f. A. B., 1782.

Glycerium Edw. (not Doubl.), But. N. A., Vol. 1.

Andria Scud., Bull. Buff. Soc., 11, 248, 1875.

ENTOMOLOGICAL NOTES FOR 1882.

BY PROF. E. W. CLAYPOLE.

My removal from Yellow Springs, Ohio, to New Bloomfield, Pennsylvania, has had the effect of breaking off the line of my entomological work, or at least throwing it into a rather different channel. Among the first results is a notice of the striking difference between the two places in regard to insect depredations. In my experience last year a great part of the time was occupied with fighting insects. The cherry weevil, the potato worm and beetle and the apple worm were the ringleaders; but after them came the blister beetles, the turnip flea, the corn worm, the squash bug, *et multa alia*. Here, at least during the present, or rather past season, the ravages of all these have been quite insignificant. Foremost stands the potato beetle. As soon as the young plants came up I followed my usual plan of picking them off and dropping them into a tin having a few spoonfuls of coal oil at the bottom. By this means they cause no trouble in crawling out again. Though the season was rainy, and therefore the opposite of the last, yet I found two applications of the poison dust (1 part of London purple and 60 parts of wood ashes) quite sufficient to keep the plants free from the young grubs. I am inclined, however, to recommend the use of plaster instead of ashes in a wet season. It seems to adhere better to the leaves when rain falls on them.

To my surprise there was here no second brood of the beetles this year. A few belated individuals appeared, but nothing that deserved the name of a brood. Of course the earliest potatoes were ripe before the usual second emergence, but the late ones grew and were green almost till frost came, but were perfectly uninjured after the beginning of July. I cannot learn if this is usual, for I can find no one who has been sufficiently observant, or who is sufficiently acquainted with the habits of insects in general, and with those of *Doryphora 10-lineata* in particular, to tell me. They come, they are here, they go, but when, why and how they come and go is a matter which no one here seems to have considered. Another year I shall try and make more general observations on this point.

Not only is the potato beetle less mischievous here than it was in Ohio, but all the others named follow suit. The apples are much less infested with worms; blister beetles I have scarcely noticed; corn worms are quite innocuous, and as for the cherry weevil, though the crop this year was not heavy for all kinds of cherries, and the fruit should, therefore, be at its

worst, I have not seen a score of them all through the summer. I noticed one or two on my own trees showing the crescent cut, but no more. It was almost as safe to eat the fruit unexamined, as it is in England.

By the way, I never hear any apprehension expressed concerning the migration of *Conotrachelus nenuphar* across the Atlantic. Though fruit is less abundant there than here, yet the introduction of this pest would be a very serious drawback to the enjoyment of plums, peaches and cherries, not to mention the loss caused by its attacks on the apple.

On the other hand, if these insects are less injurious in Pennsylvania than in Ohio, the imported currant worm is more so, and the growth of currants is greatly limited by its ravages. Very few persons seem to know what can be done by the use of poison to rescue the bushes and the currants. Great, but totally unfounded prejudice also exists against the use of poison, even on potatoes; many people seeming to fear lest the potato should absorb sufficient arsenic to render its use as a table vegetable dangerous. It is needless to say that all such ground of alarm has long been set at rest in the minds of those who have followed the progress of economic entomology. But prejudice is blind to reason and slow to die away.

In addition to this the various web-worms on the forest trees are vastly more numerous here than they were at Yellow Springs. In earliest spring and before the leaves are generally out, the American Lackey Moth (*C. Americana*) takes possession of the cherry trees and covers the young foliage with its net. Soon afterwards the Forest Lackey (*C. sylvatica*) follows on the same tree, but more frequently on the apple, and later still the walnuts are attacked by the Fall web worm (*H. texor*), whose nests remaining on the trees after the fall of the leaf, disfigure them through the winter.

This year, also, the oak caterpillar (*D. senatoria*) has wrought great ravages in the forest. I have seen hillsides that looked as if fire had passed over them in consequence of the destruction of the foliage by millions of this species. In the woods they could be found crawling over almost every square foot of ground and lying dead by dozens in every pool of water. The sound of their falling frass, too, was like a slight shower of rain. Farmers tell me they have never known them so abundant before within their recollection. Harris says this species lives on the White and Red Oaks (*Q. alba* and *rubra*) in Massachusetts. Here the White Oaks were untouched, and the Red Oak is not abundant. The food of the caterpillars was almost exclusively the foliage of the Black Oak (*Q. tinctoria*), the Scarlet Oak (*Q. coccinea*), and the Bear or Scrub Oak (*Q. ilicifolia*.)

CORRESPONDENCE.

DIPTEROUS ENEMIES OF THE PHYLLOXERA VASTATRIX.

To the Editor: Will you permit me to refer briefly to the Rev. T. W. Fyles's description of *Diplosis grassator*, on p. 238, vol. xiv. I am credited with the reference of the insect to the genus *Diplosis*, though in reality I have never seen Mr. Fyles's insect, whether in the larva, pupa or imago state. I simply expressed the opinion at Montreal, both to yourself, Mr. Editor, and to Mr. Fyles, that the insect would prove to be a *Diplosis*, from the general account of the larva then and there given to me. It is rather unjust to quote another's mere opinion given in this manner, when, by submitting specimens for examination, a definite and more authoritative decision could have been obtained.* In this case the reference seems to be correct, a fact which, under the circumstances, is a mere accident.

I need hardly say that there is nothing in the description that is not of so general a nature as to be at most generic, so that we have no evidence whatever as to whether the species is new or by what characters it is to be distinguished from the hitherto described species of the genus.

But my object in writing is to point out the fact that there are two different orange-colored Dipterous larvæ that attack the gall-inhabiting form of *Phylloxera vastatrix* in all its stages of growth, and particularly in the egg state. Neither of them is parasitic, strictly speaking, but merely predaceous, not only on *Phylloxera vastatrix*, but on other gall-making Phylloxerians and Pemphigians. First, we have the pale-orange or salmon-colored *Diplosis* larva referred to by Mr. Fyles, with the usual breast-bone of the Cecidomyidæ, and with the pupa showing the antennal processes at the anterior end. Second, a deeper orange larva contracting to a brown pupa with two oblique processes from the anal end, and producing a fly of a totally different family (Agromyzidæ) belonging to the genus *Leucopis*. This is by far the most efficient of the two enemies, and the larvæ have undoubtedly been at times confounded, as witness the differences between Walsh and Shimer (*Practical Entomologist*, ii., p. 19). The *Leucopis*, so far as I have investigated the matter, is undescribed and is referred to in my manuscript notes as *L. phylloxera*.

C. V. RILEY, Washington, D. C.

* The Editor is solely responsible for this reference to Prof. Riley; Mr. Fyles knew nothing of it until he saw it in print. The opinion given in Montreal as to the generic position of this insect was so unhesitating and positive in its character that we thought it not only safe but due to Prof. Riley to credit him with the determination.

Ottawa, Dec. 14, 1882.

My Dear Sir: In the last ENTOMOLOGIST, at page 198, Mr. Fyles contributed a note on a gall mite of the Nettle tree. The insect referred to is undoubtedly Prof. Riley's *Psylla celtidis-mamma*, of which I exhibited the galls and pupæ at the last Annual Meeting of the Society, and of which I have already sent you an account in a paper on "The Cicadæ and their Allies," for the Annual Report. I notice that Mr. Fyles found his galls to be monothalamous, and this agrees with Prof. Riley's description. I have found, however, in examining a large number of specimens, that many contained 2, 3, and in one case even 4 pupæ. The occurrence of *Celtis occidentalis* at Cowansville is very interesting from a botanical point of view. In this locality it is very uncommon, although from its resemblance to the Elm, it has probably been frequently overlooked. It grows to the size of a small tree from 30 to 40 feet in height, with a diameter of from 12 to 18 inches. In Western Canada I believe it is a common tree, and I should be glad to learn whether it is there attacked by this *Psylla* to the same extent it is here. In some of the galls I examined I found the larvæ of apparently two different species of parasitic Hymenoptera.

J. FLETCHER, Ottawa, Ont.

Editor Can. Ent.—Dear Sir: I am sure your readers were pleased at your printing the pretty lines on a winter butterfly, which Mr. Fletcher took the trouble to send. (See p. 219, vol. xiv.) I remember very many years ago, in January, finding a hibernating *Vanessa Antiopa* in the garret of our Staten Island farm house. It hung from a rafter and seemed almost dead. I placed it on a brick flue, which was hardly warm, but it did not revive at the time. Some few days after, the weather having become milder, I searched for it and found it where I had laid it, still on its side, with the legs drawn in. But on touching it, the wings suddenly unclosed, the insect took to flight, and, the window being open, it escaped into the winter sunshine. Some years after I found three or four specimens of *Pyrameis Atalanta* under the same circumstances, all close together, hanging to a rough rafter and perfectly torpid. On being placed in a warm room they revived in a short time and I allowed them to escape. As early as warm February days I have met the Camberwell Beauty and Admiral, in solitary state, on the wing. The south side of Staten Island soon gets warmed by the Spring sun, and is a good collecting field for the entomologist.

A. R. GROTE.

The Canadian Entomologist.

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No. 3

A MYSTERY AND ITS SOLUTION.

BY REV. W. J. HOLLAND, PITTSBURGH, PA.

Seated at my desk this evening, with a copy of Vol. I. of Edwards' Butterflies of North America before me, I am forcibly reminded, as I turn to the magnificent plate designated as "Argynnis I.," of an experience of my boyhood. My home, from 1858 to the fall of 1863, was in the village of Salem. N. C., famous as one of the most successful of the settlements made by the Moravian Brethren under the lead of the good Count Zinzendorf, and well known throughout the South as the seat of an excellent seminary for young ladies. The war broke out and the hopes cherished of sending me to the North to be educated were in consequence disappointed. I was left to pursue my studies under a tutor, and to roam the neighborhood of afternoons in quest of insects, of which I gathered a large collection. Unfortunately my stock of books upon entomology was limited, and aside from an original copy of Say's work, of no especial value. My determination of species was therefore very imperfect.

One day I spied upon a bed of verbenas a magnificent butterfly with broad expanse of wing, and large blue spots upon the secondaries. In breathless haste I rushed into the house and got my net. To the joy of my heart, when I returned to the spot, the beauty was still hovering over the crimson blossoms. But, as I drew near with fell intent, it rose and lazily sailed away. Across the garden—over the fence—across the churchyard—out into the street—with leisurely flight the coveted prize sped its way, while I quickly followed, net in hand. Once upon the dusty street, its flight was accelerated; my rapid walking was converted into a run. Down past the church, and,—*horribile dictu!*—past the boarding school that pesky butterfly flew. I would rather have faced a cannonade in those

days than a bevy of boarding-school misses, but there was no alternative. There were the dreaded females at the windows, (for it was Saturday, and vacation hour,) and there was my butterfly. Sweating, blushing, inwardly anathematizing my luck, I rushed past the school, only to be overwhelmed with mortification by the rascally porter of the institution, who was sweeping the pavements, and who bawled out after me: "Oh! it's no use—you can't catch it! It's frightened, you're so ugly!" And now it began to rise in its flight. It was plainly my last chance, for it would in a moment be lost over the house tops. I made an upward leap, and by a fortunate sweep of the net, succeeded finally in capturing my prize. I decided that it was an *Argynnis*, and noted the similarity of the silvery spots to those of *A. Diana*, of which I had several male specimens agreeing with the plate in Say. But I was sorely puzzled. In 1863 I went North. My collection followed me in 1865, after the war. I sought in vain, however, for some one to name my butterfly for me. I asked the Professor of Zoology in the College where I was pursuing my studies, to help me, but with characteristic frankness, he answered my request by saying: "I don't know anything about bugs and butterflies, and nobody else in the Faculty does." Some time later, being in London, at the British Museum, I asked to see the cases containing *Argynnis*, but my black beauty was not there represented. I described it as well as I could to the gentlemanly Curator, and made a rough drawing for him from memory, and received the reply: "You must be mistaken, sir, in your identification of the genus. We have no such *Argynnis* here, at all events."

Meanwhile my collecting ceased for the time, and my collection was deposited in the keeping of an Eastern institution of learning. There it went the way of such things when carelessly attended to. Eighteen months ago the collection was restored to me. Alas! for the most part in the form of dust and fragments. My black beauty was an unsightly wreck—a wingless, worm-eaten body on a pin.

The mystery remained unsolved for me until I opened this magnificent work of Mr. Edwards', and I now at last have the satisfaction of knowing the name of the beautiful insect I chased down the streets of Salem more than twenty years ago; and of having the assurance that in all probability the specimen I impaled that July morning was the first specimen of the female of *Argynnis Diana* ever put upon an insect pin.

NEWFOUNDLAND BUTTERFLIES. COLLECTED BY
P. H. GOSSE.

Editor CAN. ENT.:

DEAR SIR,—I send you herewith certain notes of observations made 50 years ago, by the eminent naturalist, Philip H. Gosse, F. R. S., &c., on Butterflies of Newfoundland.

I received a letter from Mr. Gosse, in the spring of 1882, from which I extract as follows:

"I began the study of Insects in 1832, when I was a clerk in a mercantile house at Carbonear, Newfoundland. For more than three years I pursued the study with great ardor and industry, making careful drawings of nearly every species I found, of all orders, often magnified. These drawings, in a small 4to book, I still possess, and for minute care I think they are in nowise inferior to any that I have executed in later years. They have never been used for publication, save a few slight allusions in my 'Canadian Naturalist,' and I have of late thought some of you American entomologists might be interested in looking over so early a record, since you are including Newfoundland in your Fauna. If it would give you the least pleasure, I will at once post it to you." At my reply to this, the book was sent, with the following note: "I do not know what is known to the U. S. entomologists about the economy and natural history of the insects of Newfoundland. I am pretty sure English entomologists know nothing at all about them, for my own drawings and observations have never been published. Therefore I have thought it just possible that these early notes of mine may embody facts sufficiently graphic and interesting to be published in one of your magazines. If you think so, you are perfectly at liberty to use them. I only stipulate that my *ipsissima verba* be not changed."

This book contains excellent colored figures of many Coleoptera, Hemiptera, Orthoptera, Diptera, Hymenoptera, and Heterocerous Lepidoptera, with all which I myself have no concern, but by Mr. Gosse's permission I am free to submit it to any specialists who care to make use of it for these orders. But in the Diurnal Lepidoptera are many species of interest, and some which have only been described of recent years. In most cases there are drawings of the mature caterpillar and chrysalis also. The species given are

1. *Papilio Brevicauda* Saunders, ♀ both surfaces, 2 figs. of mature caterpillar, and 2 of chrysalis, the green and the brown vars.

2. *P. Turnus* ♂, both sides—the pale variety; caterpillar and chrysalis.
3. *Pieris Napi*, summer form *Acadica* Edw., 2 figs. “ “
4. *Vanessa Antiopa* “ “ “
5. “ *Milbertii* “ “ “
6. *Pyrameis Atalanta* “ “ “
7. “ *Cardui* “ “ “
8. *Ctenonympha Inornata*, Edw. “
9. *Chionobas Calais*, Scud., ♀. Under side only.
10. *Chrysophanus Epixanthe*, Bois. 2 figs.
11. *Lycaena Aquilo*, Bois. “
12. “ *Couperi*, Grote. “
13. “ *Aster*, Edw. “

The figures of *C. Inornata* agree with the type specimen of the butterfly from Lake Winnipeg. I have also four examples taken at St. John's, Newfoundland, in 1880, by Mr. T. L. Mead. I have seen this species from no locality between Winnipeg and the island.

Chion. Calais was described from a single female from Rupert House, Hudson's Bay, and to this day I have not seen another example. I formerly thought it was the same as *Ch. Chryxus*, Doubl., but am satisfied of its distinctness. This admirable figure by Mr. Gosse is unmistakably the likeness of *Calais*, which like *Inornata*, is thus found in localities thousands of miles apart.

Lyc. Aster was taken by Mr. Mead at St. John's, and I have not seen it from localities outside Newfoundland.

Lyc. Couperi was taken by Mr. Wm. Couper on Anticosti, and is also found in South Labrador.

W. H. EDWARDS.

Coalburgh, W. Va., 18th Dec., 1882.

NOTES ON BUTTERFLIES OBTAINED AT CARBONEAR ISLAND. NEWFOUNDLAND, 1832-1835.

BY P. H. GOSSE, F. R. S., ETC.

PAPILO BREVICAUDA, SAUND. ; AND ITS TRANSFORMATIONS.

[Extracts from journals, kept by P. H. Gosse, at Carbonear, Newfoundland, in 1834 and 1835.]

1834, July 25.—A friend, A. E., caught for me an example of the

Black Swallowtail,* in torn condition, on Carbonear Island, a high rocky islet, about a mile in length, lying off the mouth of the harbor, uninhabited, uncultivated, partly covered with bushes—visited occasionally for summer picnics. This is my first cabinet specimen; but I had possessed an old rubbed and patched specimen which had been captured in the same locality several years before I began to collect.

July 31.—I made a visit with A. E., to Carbonear Island. We saw immense numbers of the little Orange-brown Butterfly (the *Canonympha* figured on page 22 of my Entom. of Newfoundland, 4to), and many of the *Polyommatus* (*Argus* of Ibid, p. 23).† After searching the Island, in vain, for a Swallowtail, we were just going down to our boat, when I caught sight of a great black fellow fluttering over a bed of tansy. I ran towards him, but I had to look about some time before I could find my beauty, for he had now alighted, and was so fearless that he did not attempt to fly, but continued sucking the aromatic flowers. I threw my net over him, and found I had secured a specimen much more perfect than my former acquisition.

Aug. 8.—My neighbor, Mr. Peters, gave me a beautiful caterpillar, which had been feeding on parsnip in his garden, and a few hours later he sent me another (No. 2), younger. They are of a clear apple-green hue, each segment marked by a black transverse band of velvet-black, carrying five spots of bright yellow. Each segment is also separated from its fellows by a narrower line of black. I feel confident they are the larvæ of one of the Swallowtails. The No. 2 protruded, and instantly retracted, a soft red organ from its neck.

Aug. 9.—I observed the orange-colored organ of the neck much farther projected; it was then forked, in form of a Y; it left a wetness on my finger, and diffused a strong odor of parsnip.

Aug. 11.—I am convinced that the Y-organ of the neck is used as a defence; for, on my touching the side of the caterpillar—the left side, for instance—it would jerk its head round to the place, and protrude the *left* branch of the forked horn; if I touched the right side, the *right* branch would be protruded; the *other branch*, on each occasion, *being kept undisplayed*, while a strong fetor was manifest. The caterpillar No. 1 has moulted to-day.

* *Papilio-brevicauda*, Saund.

† *Lyc. Aster*, Edw.

Aug. 16.—The younger (No. 2.) moulted. There is a marked difference in the coloring of the two examples. This one has the yellow spots circular in outline, and quite insulated, centrally, on the black bands; but No. 1 has the spots of oblong shape, and placed *upon the front edge* of the black bands, interrupting it.

Aug. 21.—In Peters' garden I found, on the parsnip leaves, two more Swallowtail caterpillars, larger than my largest (Nos. 3 and 4).

Aug. 22.—My No. 1 is hanging, back downward, from the roof of its cage, a silken band round its body, and its tail fastened to a knob of white silk. In the evening No. 3 suspends itself in like manner.

Aug. 23.—This morning I was so fortunate as to see the process of No. 4 putting the already spun silken girth over his head, and adjusting it around his shoulders.

Aug. 24.—No. 1 went into chrysalis during the forenoon. It is large and rough of surface, of a yellowish pink hue, green in some parts, marked with a broad streak of sooty brown down the back, and one down each side of the abdomen.

Aug. 25.—This morning I saw that No. 3 had already become a chrysalis. About 5 p. m., I witnessed, with great pleasure, the whole process of the evolution of another chrysalis, my No. 4—the one whom I had seen put on his necktie. This caterpillar appearing uneasy and restless, I watched it at intervals for about half an hour; when, by strong and apparently painful distension of the part, a slit was made in the skin, down the back of the third ring. Through this the soft chrysalis forced itself, gradually extending the slit *upwards*, till the head was divided and separated; and also *downwards*, for several rings' length. The skin was now gradually pushed down. I had been curious to see how the creature would get through this part of the business, for its weight pressed the silken girth very tight around the body. There seemed, however, no real difficulty; I thought it kept itself, by muscular effort, from pressing its whole weight on the girth until the skin had passed the part. As soon as it was pushed down to the extremity, the tail of the chrysalis was thrust out beneath, very cleverly, and pushed upward to take hold of the little knob of silk. When this was done, the old wrinkled skin was jerked off, and cast away, by the writhing of the pupa. The silken girth was now encircling the body, between the sixth and seventh rings; but the chrysalis twisted and turned, till it got the girth three rings nearer the head, namely,

across the middle of the wing-covers. The skin was as yet so soft, and the silk so slender, that it cut into the wing-covers, so far as to be invisible ; but, as all my specimens are alike in this respect, I presume it is no other than natural. The shape of each was different, immediately on expulsion, from what it became after some hours ; the fore parts being awkwardly shortened and shrivelled, and the hind wings stretched out.

Aug. 27.—Caterpillar No. 2 finished his girth, and put it over his head, about 8 a. m., and so is suspended.

Aug. 30.—This No. 2 went into pupa in the early morning. In this case when the skin was stripped down, the tail was not put out to take hold of the silken knob ; and, by and by, the old skin loosed its hold of the silk, and the chrysalis was swinging about, suspended only by the girth. I proceeded carefully to assist nature by removing the old skin, and putting the tail to the silk, of which its projecting points now took firm hold. The girth, however, remains between the sixth and seventh rings, so as to cause the fore parts to hang down considerably. In shape it resembles the other three ; but in color it is widely different, being wholly of a bright yellowish green, except a wide band of pale yellow down the back. This individual is the one which, as a larva, had the peculiarity of the yellow spots, which I noticed on the 16th inst., and from both circumstances, I fully expect the imago to be of a different species from the others.

1835. June 25.—To-day I sailed from Carbonear for Canada, carrying with me the four Swallowtail chrysalids of last summer, all alive and apparently healthy. .

July 4. At sea, in the Gulf of St. Lawrence.—From the yellow and green chrysalis, No. 2 (see note on Aug. 30, 1834), was evolved before day, a specimen of the Black Swallowtail—*Papilio Asterias (brevicauda)* of Saunders.) It is identical with the examples taken on the Island last summer, but in great beauty of perfection ; the wings are not in the least injured from the cutting of the pupa-skin by the girth (see Aug. 25, 1834), nor by the accident that the girth has been, for some weeks past, broken ; one side first giving way, then the other, so that the chrysalis has been hanging perpendicularly.

July 14th.—One of the drab-hued, brown-striped chrysalids produced the butterfly this afternoon.

July 18 and 20. At Quebec.—The other two were evolved. Those of the 4th and 14th had been kept in glasses, exposed to the sunlight, all

the winter ; these last two had been shut up in a dark box. Thus all my four examples have produced perfect imagines. I can discern no specific difference among these last three, *inter se* ; nor—what is much more remarkable—between them and the one from the yellow and green chrysalis, evolved on the 4th instant. The variation in color, which distinguished this individual, both in the larva and pupa (as I have described under dates Aug. 16 and 30, 1834), seems, therefore, a very noteworthy circumstance.

The liquid discharged by these butterflies, immediately after their evolution, is whitish, or cream-colored. The duration of the period of puparepose is not quite uniform. It does not fall much short of eleven months, from about the middle of August to about the middle of July. And the evolution of my individuals kept in unnatural confinement through the winter, does not sensibly vary, in seasonal period, from that of the examples caught on Carbonear Island, last July.

One of my evolved specimens, before it was killed for the cabinet, laid five globular yellow eggs. So that I have seen this beautiful insect in all its stages.

P. Turnus, Linn. Dwarfed in size, and paled in hue, from the normal American condition. It is very uncertain in its appearance ; in some seasons I have seen 15 or 20 examples ; in others not one ; it must always be considered scarce. In my "Canadian Naturalist" I have given a few notes of these species.

Pieris Oleracca, Harr. Always abundant ; a nuisance in the cabbage-gardens. The 1st brood appears early in June ; the 2nd late in August and early in September, at which times we find oleraceous plants studded with the oblong, whitish eggs. I once saw a ♀ lay an egg ; she alighted on the under side of a leaf of horse-radish, and immediately, bending her abdomen down, touched the leaf for an instant, and flew away. Looking at the spot I found the white egg adhering by its end. I have had females lay several eggs, when pinned on the setting board. I once found a pupa which was all over of a light pellucid green hue ; this is always the color when newly evolved, but in this instance the green hue remained without any change till the imago appeared, some ten days after I had found it. Another unusual circumstance was that this chrysalis, instead of being horizontal, was bound in a perpendicular position, head downward to an upright post. The June brood have remained in pupa through the winter,

the August brood only about a fortnight. What becomes of butterflies at night? I had often asked. One evening after dark, I saw a *P. Oleracea* resting with closed wings on a stalk of grass. I threw it into the air repeatedly, but it would not fly: it merely fluttered to the ground, and made no resistance to my taking it up again.

Vanessa Milberti, Godart. The first butterfly that gladdens our eyes in spring, appearing on sunny days in the middle of April, but in no considerable number in May. Then it becomes by far the most abundant of all our butterflies, more common than even the Garden White, and that in every season. It seems to survive the long and severe winter. I once found one, half-torpid, on the 15th October, resting, with closed wings, on a stone *in the midst* of a loose heap; and a gentleman presented me with another, living, but torpid, which had fallen from a loft on the 5th of April. This last was certainly a survivor of the winter.

About the middle of June we see the tops of the growing nettles covered with unsightly webs, which are inhabited by families of the little black caterpillars of *Milberti*. They live in society some time after they are hatched; but as they grow up they separate into groups of four or five on each plant. As they are not long eating the choice leaves of one nettle, they colonize to others, leaving their deserted habitations mere leafless stalks, covered with the dense and cloth-like web, and with the excrement and sloughed skins of the caterpillars.

When full grown they have a rather repulsive appearance, being black above, dingy green below, with toothed spines. But the beauty of the chrysalis atones for the ugliness of the caterpillar; for the numerous sharp points on the brown segments are of a most brilliant gold, like polished metal. Occasionally we see examples of more than usual splendour; the abdominal rings of a dull red, and the whole fore parts of polished gold, tinged with green. Alas! it is a fatal beauty! for all such specimens are punctured by parasitic flies, the terrible "Long Stings;" and from every one there are sure to emerge one or more of these rascally ichneumons.

V. Antiopa, Linn. Rather rare, flying round the tops of willows. Fine specimens measure $3\frac{1}{2}$ inches in expanse; the border of the wings, which in European examples is buff, is in Newfoundland examples pure white, speckled with blackish; at least in the female.

Pyrameis Atalanta, Linn. The Red Admiral is sufficiently abundant with us. As soon as summer is fully set in our gardens are gay with this

very fine insect, itself looking like a brilliant flower. Like other members of the group, it often alternately expands and closes its beautiful black and scarlet wings in the sun when resting from flight. There seem to be two broods in the season; one appearing in June, one in Sept. and Oct. The transformations of this wide-spread species are sufficiently known. A day or two before the evolution of the butterfly the brilliant marking of the fore wings becomes distinctly visible through the transparent skin of the pupa; but all in miniature. I have taken a chrysalis in this condition between my fingers, and gently pressing it till the skin of the back cracked, the butterfly crawled out. Though it was quite lively, the wings did not begin to expand for more than an hour; then they rapidly attained their full size and perfect form, without any injury from the premature birth. Though the Red Admiral is so abundant in Newfoundland, I cannot recollect that I ever met with it in Lower Canada, and very rarely in Alabama.

Pyr. Cardui, Linn. The last remark is true of this universally distributed species also. In Newfoundland, however, it is more abundant as larva than as imago; the caterpillars, in great societies, crowding the web-clothed thistles by the wayside, which I have found very easy to rear, while if we search the same plants a few weeks later no trace of one and not even an empty pupa-skin appears, and the butterflies are far from numerous. The chrysalis is even more beautiful than that of *Milberti*, the gilded spots being often orange-colored.

Chionobas Calais, Scudd. Of this species I am sorry to say I can give no account, except the colored figure in my book of drawings, which was certainly made from a specimen taken near Carbonear.

Cænonympha inornata, Edw. If my little Orange-brown is indeed this species, it must be wide-spread, since this reaches to the Pacific. In Newfoundland it is not uncommon, though local. In Aug. 1833, I found a few specimens on Carbonear Island, and in July of the following year, immense numbers were swarming there, though only one or two straggling individuals were to be seen elsewhere. I know nothing of the immature stages.

Chrysophanus Epixanthe, Lec. This tiny butterfly, which I called the Purple-disk, was the smallest species that I had ever seen, expanding less than an inch. It appears to be rare. I met with it only in 1834, at the end of July and the beginning of August, chiefly on some low shrubs, unknown to me, whose leaves have an aromatic odor somewhat like that

of the orange tree growing in some abundance on the banks of a brook behind the town of Carbonear. A few examples only occurred, but from its minuteness and dull hue it may be easily overlooked. Yet the area of the upper surface, though dull, has a rich purple flush in some lights.

Lycena Aster, W. H. Edw. This species, which I had supposed to be our English *Argus*, is far more common than the preceding. In the summer of 1834 it was nearly as abundant as the little Orange-brown on Carbonear Island, where every step aroused numbers of these bright little creatures from the grass to sport in the sunshine. It was surprising to see how much the beams of the sun, reflected in every direction from their lustrous wings, added to the life and gaiety of the scene. I have found the species not rare also on Bake-apple Marsh, during July and August, the hottest and brightest part of our short summer.

Lyc. Couperi, Grote. On the other hand I am acquainted with but a single specimen of this species, which I distinguished as the Silver Blue. This was caught on Carbonear Island, on the 10th of July.

Lyc. Aquilo, Boisd. The Lead-grey Blue. This too is found on Carbonear Island in July, but by no means commonly.

The above-named are all the butterflies that I have actually taken in Newfoundland. But there are doubtless some that escaped me. In May, 1835, as I was on Flagstaff Hill, about a mile from the town of Carbonear, I saw a small butterfly, strange to me, red, with black spots. It may have been *Melitæa* or *Chrysophanus*. I observed it five or six times during an hour that I remained there, but, though it flew near me, I could not catch it.

ON THE GENUS AGROTIS.

BY A. R. GROTE, A. M.

In the Reports of Dr. Harris and Prof. Riley and some other State Entomologists, the structural characters of the genus *Agrotis* are not given, and the term is evidently loosely applied to cover certain Noctuidæ known as "cut-worms." In Dr. Harris's Report, as I have shown, the moth *Hadena devastatrix* (the *Agrotis devastator* of Brace) is considered to be an *Agrotis*, while *Agrotis clandestina*, which has the structural characters of *Agrotis*, is referred to the old Linnean genus *Noctua*, now without

standing in our lists. The three genera to which the "cut-worms" are referable, *Agrotis*, *Hadena* and *Mamestra*, are separated in the Preface to my list of the Noctuidæ, p. 3, April, 1874, by their characters.

The genus *Agrotis* is recognized, in a more or less extended sense, by all modern writers upon the *Noctuidæ*. It is very numerous in species, over two hundred and twenty-five being described from our territory. The perfect insects may be known by their rather narrow and pointed fore wings, which are even along the short external margin, and the rather full and rounded hind wings. They are usually of a brown or gray color, and the primaries above show the stigmatal marks plainly; the two ordinary spots on the cell are often relieved by a black or dark shade spreading between them and on either side of them, setting them off. The median lines are usually not very distinct: they are often double, darker than the wing, and form little scallops, as curves between the veins. The structure of the genus must be made out with the help of a lens, under which the compound eyes will be found to have the surface naked; the ocelli are present; the middle and hind tibiæ are always, and usually the front tibiæ as well, spinose, or covered with prickles, similar to those usually present on the tarsi of all Noctuids. Besides these characters, the body is deprived of tufts along the dorsal line which signalize the allied genera of "cut-worms," *Hadena* and *Mamestra*. The labial palpi are not very prominent; the tongue is well sized in almost all the species; the front is smooth; the vestiture or clothing of the body is of a hairy character, rather smooth than rough. The antennæ of the males are of varied structure; sometimes they are simple, merely provided with little hairs or ciliæ: again they are brush-like, serrated, or again quite lengthily pectinated or feathered. The type of *Agrotis* is *Segetum*, and we owe the generic name to Hubner.

Subdivisions of the genus can be undertaken when the form of the genitalia is studied. This character, taken in connection with the antennal structure, will give us sub-genera and assist in the identification of our numerous species. I cite 206 species in my late Check List, one (*rufipectus*) has been forgotten; I have described nearly twenty since, not all at this writing published (in a paper in the Annals and Magazine for Natural History, Jan., 1883, will be found several new forms found by Prof. Snow in New Mexico). I have separated from *Agrotis* the genus *Agrotiphila*, founded on the constricted eyes, a good character which, indeed, allies the moth (*Montana*) to *Anarta* and the Heliothid genera;

it is said by Mr. Morrison to have a European analogue not known to me. Lately I have described the genus *Carneades*. This is based on a species I should otherwise have referred to *Agrotis (moerens)*, but the clypeus is roughened with a navel-shaped protuberance, around which the frontal hairs converge, while the infra-clypeal plate is prominent. To this genus, *Carneades*, I also refer *Agrotis citricolor*. Grote, which shares the embossed clypeus. On examination the pattern of ornamentation is the same; *Citricolor* is light yellow, *Moerens* is ochrey fuscous, varying in the depth of shade; both have the terminal space darker, the reniform with an inferior dark spot; the two are western, *Citricolor* from Colorado and California, *Moerens* from Arizona; the size is moderate (30 to 26 mil.) *Anytus* differs in the shape of the thorax, which is more square in front and approaches that of *Lithophane (capax)*, which led me to place the moth (*Sculptus*) in that group at one time; the moth hibernates, but so do some other *Agrotis*, as now appears. In addition the eyes are lashed. As to this last character I am not certain but that it is shared by other species. My notes on this character were made in 1875, and the species must be again examined. *Adita* has a claw on the front tibiæ, and the species (*chionanthi*), rediscovered by myself in New York since its illustration in the last century from Georgia by Abbot & Smith, is otherwise a striking and peculiar form. While these four genera rest upon decided characters, three others: *Anicla*, and *Matuta*, and *Pleonectopoda* are of doubtful value and are not considered valid in my late Check List. The type of *Anicla* is *incivis*, and the other forms agree with this (*beata*, *lubricans*) in the close short vestiture, the simple antennæ, the black velvety band in front, the pale, sub-diaphanous secondaries, the long abdomen. Comparative as these characters are and shared by other species singly. I yet believe when the genitalia are studied that we shall be able to use this term in a sub-generic sense. The type of *Matuta* is *Catherina (manifestolabes)*. This is a red species with pectinate antennæ and looking like the European *Tæniocampa rubricosa*. Probably this also may be used in a sub-generic sense and include such forms as *Manifesta*, *Orthogonia*, etc. I have not been able to examine any of these carefully; the species seem to be rare, and with the exception of the type, a female *Catherina* (mistaken by me for a male), have never been in my possession. The type of *Catherina* I photographed for the CANADIAN ENTOMOLOGIST and returned it to Mr. Norman too quickly; I saw it lately in Coll. British Museum. Finally with regard to *Pleonectopoda*,

the type (*Lewisii*) is an ordinary *Agrotis* with the fore tibiae very lengthily spinose and, apparently, a slight tuft on thorax, which latter character may be accidental. In perfectly fresh specimens of *saucia*, there is, however, a species of creasing which is very curious. With regard to other genera proposed by European authorities at the expense of *Agrotis*, we have in our fauna representatives of *Ammonoconia*, which has a distinct longitudinal thoracic ridge of scales, and is apparently valid. The same character separates *Epiglaea* from *Glaea*. It is less strong, however, than any of the four genera above discussed and established by me. Our forms are much slighter than the European type of *Ammonoconia*. The sub-generic term *Eurois* (*occulta*) may be retained for large, wide-winged forms. I should think that *Clandestina* and *Cupida* would afford sub-generic types.

The genus *Agrotis* should first be divided by the separation of the forms with non-spinose fore tibiae, then the other characters here discussed should be used. In this way the monographist will do a good work, now much needed.

With regard to the species, there may be too many separated from *Cupida*, although Prof. Lintner seems hardly to be agreed with this. The western forms are very confusing, and the range which I admit under "*Cupida*" is very great, though in all probability it will have to be extended to admit both *Alternata* and *Brunneipennis*. *Variata* I regard as decidedly distinct. *Recula* may be an extreme form of *Cicatricosa*. The forms allied to *Campestris* (i. e., *Decolor*, *Albipennis*, *Nigripennis*) may have to be all united under the name *Declarata* of Walker, which, applied to western specimens under an erroneous generic appellation, is probably the oldest term for any of them. The western specimens (coll. Neumoege) which I have labelled *Declarata* can hardly be distinguished from eastern *Campestris*. As to the species erected at the expense of *Subgothica*, we certainly ought to be able to decide the matter by breeding them. While there is no difficulty in separating *herilis*, from the ornamentation of the primaries, *tricolor* is considered hard to recognize always with certainty, by some correspondents who have probably had a larger material to look over than myself. As for the great bulk of the species cited in the New Check List, they are undoubtedly valid. As compared with the European fauna, our species of *Agrotis* are far more numerous. Staudinger gives 170 species, but he includes Labrador forms. In my opinion he is not justified in this procedure; the resemblance is owing to the presence of Arctic forms (*Anarta*, etc.) The Labrador

fauna is a true extension of that of New England, and is copied in miniature on the slopes of the White Mountains.

ON THE GENUS LEUCOBREPHOS.

BY A. R. GROTE.

In my Check List (1876) I proposed three new generic names, *Consercula*, *Oxylos* and *Leucobrephos*. I have since discarded *Oxylos* and given the character which separates *Consercula* from *Trigonophora* Led. There remains *Leucobrephos*, which, owing to the kindness of Mr. Butler, who has examined Walker's types for me, I now describe as follows:

LEUCOBREPHOS Grote; Type: *Anarta Brephoides* Walk.

Male antennæ with longer pectinations than *Brephos*, and broader. Palpi concealed by the beard-like hair, more thickly hirsute than in *Brephos*. Eyes narrower, smooth, naked. The neuriation differs by veins 3 and 4 of primaries arising from a common foot-stalk. On secondaries veins 3 and 4 arise from a long stem, diverging near the margin.

Leucobrephos Brephoides has been twice redescribed, by Prof. Zeller as *Archicaris Resoluta* and from a mutilated specimen by myself as *Melicteptria Hoyi*. Its occurrence in the United States, Wisconsin, is remarkable. Although I originally, nearly twenty years ago, determined the species from the Yukon River, in the Proceedings of the Entomological Society of Philadelphia. I failed to recognize the species from the specimen (wanting antennæ and legs) sent by Dr. Hoy. The genus seems to be sub-arctic and probably embraces *Amphidasys Middendorffii*, from Siberia, besides the North American type.

Family BREPHIDÆ.

Leucobrephos Grote (1876).

Brephoides Walk. *Middendorffii* Men.

Resoluta Zeller.

Hoyi Grote.

Brephos Hübn. (Tentamen).

Infans Moschl. *Nothum* Hübn.

Hamadryas Harr. *Puella* Esp.

Parthenias Linn. *Spuria* Hübn.

The species described by Boisduval from California are probably Arctians and do not belong here.

The two genera are regarded as comprising a distinct family by Dr. Herrich-Schæffer, and probably correctly. The earliest name for it seems to be *Noctuo-Phalenidi* of Boisduval. Following a corrected terminology, I should call it *Brephidae* in future.

ENTOMOLOGY FOR BEGINNERS.

THE MELON MOTH—*Eudiotis hyalinata*, Linn.

BY THE EDITOR.

A specimen of this beautiful little moth, known also under the name of *Phakellura hyalinatalis*, has been taken by Mr. J. Alston Moffat, in the neighborhood of Hamilton, the first capture, as far as we know, of this insect in Canada. It is shown in figure 3. The wings are of a pearly white color with a peculiar iridescence, bordered with black, and they measure when expanded nearly an inch across. The body and legs are of the same glistening white, and the abdomen terminates in a movable brush-like tuft of a pretty buff color, tipped with white and black. It is very widely disseminated, being found throughout the greater part of North and South America; and is very common in some sections in the Southern States.



Fig. 3.

The larva, shown also in the figure, is, when mature, about an inch and a quarter long, translucent and of a yellowish green color, with a few hairs scattered over its

body. They are frequently found feeding on melon and cucumber vines, and do not confine their attacks to the leaves, but eat also into the fruit, either excavating shallow cavities on the surface, or penetrating directly into its substance. They spin their cocoons on a fold of the leaf, as seen in the figure, within which they change to slender brown chrysalids about three quarters of an inch long, from which in a short time the perfect insect emerges.

The beautiful figure illustrating this subject was drawn from nature by Mr. Marx, of Washington, and published in Prof. Comstock's Report, as Entomologist of the Department of Agriculture, for 1879. Through the kindness of Dr. Loring, U. S. Commissioner of Agriculture, we have been supplied with an electrotype of it.

OBSERVATIONS ON LIMENITIS ARTHEMIS.

BY MRS. C. E. HEUSTIS, PARRSBORO, N. S.

I was much interested in an article in Vol. xiii. of the CANADIAN ENTOMOLOGIST, by Mr. W. H. Edwards, entitled, "Is *Limenitis arthemis* double-brooded?" My own observations previous to the time of reading the article were confirmatory of Mr. Edwards' theory; but I wished to learn more of this interesting species before hazarding any remarks concerning its habits.

I have never reared or attempted to rear *arthemis* from the egg, but have one specimen obtained from a full-fed larva found on the 2nd July, 1877. It went into chrysalis on the 3rd, and the imago appeared on the 16th. I have seen fresh looking specimens on 1st July, when enjoying, with other citizens, "Dominion Day" in the country. Later than this I have not seen a fresh specimen, excepting the example before recorded.

I find in an old note book the following entry: "Parrsboro, N. S., July 25, 1877, captured to-day a worn and battered specimen of *Limenitis arthemis*, the only example seen, although the species is usually abundant in this wood." A few days later I saw another specimen less worn, but did not succeed in capturing it.

The bustle consequent upon a change of residence prevented me in the early part of last summer (1882) from doing much collecting, so that I had no opportunity to observe at how early a date *arthemis* appears here; but later in the season I spent a few days with some friends in a

collecting tour along the south shore of Cumberland Co., N. S., a distance of 45 miles. We were in search of plants and minerals, as well as insects. We started on the 15th of August; on that day I observed two examples of *arthemis*, one of which I took. It was sitting on a low shrub, and seemed to be perfectly stupid, making no attempt to escape when I put my hand on it. It was a good deal worn and damaged. On the three following days I observed quite a number, all in the same condition. At several points they were quite abundant, especially where our road lay through damp woods. Thus, so far as my observation extends, both in New Brunswick and Nova Scotia, *arthemis* may be taken occasionally, in good condition, as late as the middle of July, after which date I think few, if any, fresh specimens will be met with.

I have no doubt that worn and faded specimens might have been found in this county throughout August, or even in September last year. The extreme backwardness of the spring probably retarded the development of the larvæ, and thus caused the imagoes to be seen later than usual

CORRESPONDENCE.

I have used the Pyrethrum powder, "Buhach" mixed with ten parts of flour, as the easiest and most effectual remedy for the cabbage worm. It was mixed in 1881 and remained in the "insufflator" till the past summer without apparently losing any of its virtue. Its effect was in no wise diminished. I gave some of the mixture to a friend here whose sheep were infested with ticks, requesting him to try it and report to me. He did so, saying that the ticks seemed to enjoy it and he rolled them about in it without inconvenience or injury so far as he could see.

I have both kinds, *Pyrethrum roseum* and *P. cinerariifolium** growing from seed sent me by Prof. Riley.

There are marked distinctions between the plants from the very first. The seed leaves of *P. roseum* are spatulate, those of *P. cinerariifolium* are oval. The former throws out a single leaf from between them; the latter throws out two together. The foliage of the former has a tendency

* The usual spelling of this word cannot be defended, and is against the analogy of almost every other similar term of classic origin.

to lie flat on the ground, and looks comparatively feeble; that of the latter is ranker and stands much more upright. The plants now (January 1st) look healthy and strong. *P. roscum* lived out of doors in Ohio through last winter without the slightest care or protection in a box above ground. Some of the plants began to grow in February, but a heavy rain, followed immediately by a hard frost, unfortunately killed their roots late in the spring. Had they been in the ground this accident would hardly have happened. So far as I can now see *P. cinerariifolium* is the more hardy of the two. I will report later on my success, if I have any, during the coming season of 1883.

E. W. CLAYPOLE, New Bloomfield, Pa.

Dear Sir: An office-mate made a capture last summer in a novel manner, but such as would not meet with the favor of entomologists as a method of collecting. He had occasion one hot midsummer day (29th June) to go out for a short time, and on returning complained that a fly had flown into his ear, and, having crawled in as far as possible, was causing great annoyance by a disagreeable buzzing and scratching. I advised him to pour a few drops of oil into the infested organ, or, better still, perhaps, to seek a doctor and have the occupant extracted by skilled labor. On reaching his doctor's office he found that he was absent at a medical convention, but after telephoning all over the city he found a stay-at-home doctor to whom he went and stated the case. An examination of the ear was made, but the doctor could discover nothing in it, and as the buzzing and scraping had then ceased, it was decided that the insect had taken his departure. However, he said it would do no harm to pour a little oil into the ear to allay the irritation which the fly had caused. My friend had not gone far from the office when the insect, which had only been taking a rest or "playing possum," commenced a more violent commotion than ever, causing his unwilling host to hurry home and try the anointing process. Hastily pouring in a few drops of oil, he lay down with his ear on a pillow, and almost immediately felt the intruder withdrawing from his hiding-place and beating a retreat. Lifting his head he was astonished to see, not a fly, as he expected, but a long-legged, active beetle, scampering away. This he imprisoned and bore back triumphantly to me to identify. It proved to be a full-sized and lively specimen of *Acmeops pratensis*. The doctor, on being afterward confronted with the prisoner, was greatly surprised that it had so well secreted itself

from him, and assured my friend that it might easily have caused serious trouble. Small insects cause frequent annoyance and occasional slight pain by flying into eyes and ears, but it is fortunate that such formidable hard-shelled beetles as the species just mentioned do not make a habit of exploring our ears. Had the case been that of some "blockhead," one might have supposed that the beetle had visited him under the guidance of instinct, but in the present instance the intrusion must have been merely the result of accident.

Much as beetles injure man's property, they seldom attack his body, but there is one Canadian species which most decidedly indulges in that unpleasant habit, and to an extent that is perhaps unknown to many entomologists. I refer to *Melanophila longipes*, which occurs here from 12th May to 12th Oct., and is usually abundant during the hot season, basking upon stone walls, etc. It has a fashion of lighting on one's collar and inflicting a sharp nip on the nape of the neck, and then disappearing with great swiftness. I have often been thus bitten, and have sometimes, by making a sudden grab, taken the beetle in the act and proved his identity. Last summer several instances of persons being bitten fell under my observation. While at dinner one day in a hotel, three or four sitting at the same table complained that some "confounded fly" had nipped them viciously. The gentleman sitting next to me was one of the victims and caught the offender, but it escaped almost immediately, only allowing him to see that it was black and harder than a fly. I was just going to say that it was probably a specimen of *M. longipes*, when I got a nip that settled the question and the insect.

A few weeks ago I was trying to convince two ladies that beetles might be handled fearlessly, as they had no biting propensities, when one of them at once exclaimed, "don't tell us that, for there is a nasty, little, flat, black beetle that bites me on the neck in the summer."

Ottawa, 25th January, 1883.

W. HAGUE HARRINGTON.

LISTS OF NAMES OF CANADIAN INSECTS.—The Council of the Entomological Society of Ontario having recently decided to issue additional sheets of the names of insects of all orders found within the Dominion of Canada; we should be glad to receive from any of our Canadian members lists of such insects as they may have which are not included in the sheets already published by the Society, so as to make the sets as complete as possible.

The Canadian Entomologist.

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No. 4

PRACTICAL ENTOMOLOGY.

"MOSS-HUNTING."

BY PROFESSOR J. T. BELL, BELLEVILLE, ONT.

Having had several enquiries addressed to me as to how I captured the Pselaphidæ, etc., a list of which appeared in the ENTOMOLOGIST of March, 1881, it has occurred to me that it might be acceptable to some of my entomological brethren to have a detailed account of my method of moss-hunting published in our organ.

First, then, as to gathering the moss. For pedestrian excursions, a game bag, or haversack, to sling over the shoulder, will be most convenient; where a vehicle is employed, a pillow case or grain bag may be used, and in either case a small hand rake about a foot long will be found very useful. As soon as the snow leaves the ground, the collector may seek some open swampy woods, where the ground is varied with little mounds by the decay of fallen trees or the upturned roots of wind-falls, which are overgrown with mixed mosses,—or the banks of a pond or creek, strewn with rotting logs and branches. The moss should be taken up in large flakes, with as little disturbance as possible, and packed tightly in the bag. It is of little use taking the moss which grows in thin sheets on the stumps and trunks of trees, as few insects will be found in it, and there is one sort which grows in compact oval bunches of a bright green, which I uniformly reject as barren. The most productive is that which grows on the ground, and is not less than an inch in length of stem. So long as the ground is clean of snow, a little frost is not objectionable, but rather the reverse, as some of my most successful collecting was done when the moss was pretty well frozen, and the pools were covered with ice strong enough to walk over; but whatever may be the weather, the moss must be damp,—insects will not live in dry moss.

Having brought a cargo home, the next step is to get out its living treasures, for which the following implements will be needed: 1. A sieve,

which can be easily and cheaply made as follows: A light wooden box about 9 in. by 7 in. may be had at any drug store; the bottom is knocked off and replaced with a piece of wire-web of four meshes to the linear inch; the sides must be cut down with a fine saw to a depth of three inches, and strips about $\frac{1}{2}$ in. wide nailed along the sides beneath the wire to keep it from touching the table. 2. A sable or camel hair pencil of the size known as duck quill, on a wooden handle. 3. A pair of flexible tweezers with fine points. 4. A small palette knife, the use of which is when a small insect is covered up among the dust and debris of the moss, to take up a portion and scatter it on a bare place on the paper, when the beetle will become accessible. 5. A hand or pocket magnifier. 6. Two cyanide bottles, without saw dust. 7. A basket or box to receive the spent moss.

The operator will place the sieve upon a sheet of strong white paper, —cartridge paper is best,—and taking up a moderate handful of moss, tease and shake it well over the wire; he will then lift the sieve, giving a couple of smart taps on the end to dislodge any clinging insect—and look out for the “bugs.” The Carabidæ and Staphylinidæ will first run at racing pace over the paper: the Pselaphidæ and Scydmaenidæ will progress more deliberately, though still pretty rapidly, in a steady, straight-forward march, with their prominent antennæ stretched out before them, while the Trichopterygidæ will circle about, like the Gyrini upon the surface of a still pool, at an astonishing speed for such molecules of beetles. The larger insects may be captured with the fingers or the forceps; the smaller ones by moistening the brush between the lips and touching them with the point, to which they will adhere; the brush with the insect attached is introduced through the neck of the bottle, when a slight fillip with the fingers will dislodge the captive. In the meantime the Curculios, Chrysomelas, Tenebrios, etc., will recover from the shock, and betray their presence in their own slow, deliberate manner, when they too can be secured. Along with the beetles there will be seen numerous spiders, ants, mites, poduras, etc., and now and then a few small Diptera and Hymenoptera.

To display the smaller captured beetles to the best advantage, they should be suffered to remain twenty-four hours in the bottle, when the cyanogen vapor will have caused their limbs to be limber and relaxed. They may then be attached to a strip of card-board by a small portion of mucilage, previously thickened by evaporation till it will not spread out

or sink into the card. A sufficient number of spots of this are placed about a quarter of an inch apart, and on each spot is laid a beetle, back down, care being taken that the head, legs and antennae are kept from contact with the cement. When the latter has hardened sufficiently to hold the insect in its place, its antennae, palpi, legs, etc., may be adjusted with a very small, short-haired, red sable pencil, just moistened enough to make the hairs adhere together and form a single point. For the larger and more refractory ones, a fine sewing needle, set in a wooden handle, and bent at an obtuse angle at the point, may be used.

When the limbs have been properly adjusted, the insects may be laid away to dry, which will require three or four days for the smaller, and twice that time for the larger ones. When dry they may be removed from the card by inserting the point of a fine needle under the shoulder; if this is carefully done the insect will generally come clear off without damage to the most delicate pubescence or the longest bristles. Any portions of the mucilage which may adhere to the elytra, may be removed with the needle point or the sable pencil moistened as before. Each specimen may then be mounted on a strip of card-board, or fastened in the cell of a microscope slide with a minute touch of Canada balsam, and a thin glass cover cemented over it, when it will form an interesting object for examination either by direct or transmitted light.

ACKNOWLEDGMENT.

Prof. Bell has kindly sent with the above paper a series of specimens illustrating the families of insects he has referred to, all neatly mounted on microscopic slides, comprising twenty in all. Many of these are extremely interesting, and the mounting is such as would do credit to an expert. We are greatly indebted to our friend for this liberal donation to our Society's collection. They are valuable not only as beautiful slides for the microscope, but have also been carefully determined and are numbered to correspond with the numbers under which their names are found in Crotch's Check List, and hence will be very useful for reference. This is the second time we have had the pleasure of calling attention to Prof. Bell's liberality in this direction.—ED. C. F.

DESCRIPTION OF THE PREPARATORY STAGES OF
NEONYMPHA CANTHUS, LINN. (EXCEPT
THE CHRYSALIS.)

BY W. H. EDWARDS, COALBURGH, W. VA.

Egg.—Sub-rotund, broadest at base, and there flattened; surface slightly rough, but without definite markings under a pretty high power; color greenish-white. Duration of this stage about 7 days.

YOUNG LARVA.—Length just from egg, .09 inch; color yellow-white; but in a few hours changes to pale green; shape cylindrical, long, slender; the last segment bluntly bifurcated; on each segment a few tubercles, each of which gives out a clubbed white hair; head, at first, nearly twice as broad as 2, obovoid, truncated and depressed; on each vertex a small rounded prominence, indented at top, and from the middle of the hollow rises a little tubercle, with a bristle; color light brown; the surface shallowly pitted, and sparsely pilose; ocelli reddish brown.

At three days from the egg, length .18 inch; color pale green; on either side now appear three whitish longitudinal lines, one near middle of dorsum, one on the verge of the dorsal area, and one on middle of the side. As the first moult approaches, the body becomes broad as the head, and vitreous-green, with the white lines as before described. To first moult about 8 days.

After First Moult.—Length .26 inch; slender, slightly thickest in middle segments; the tails longer in proportion than at first stage, slender, sub-conical, pink-tipped, rough with white pointed tubercles and short bristles; each segment several times creased transversely, and on the ridges so caused are fine white tubercles, with short hair to each; color at first greenish-yellow, afterwards changing to pale green; on middle of dorsum a dark green stripe, free from tubercles; on either edge of this a line of white tubercles, another sub-dorsal, a third along base; between the last two are two other fine white lines, and one such between the dorsal and sub-dorsal; feet and legs green; head broader than next segment, obovoid, the sides more sloping, less rounded, than in first stage; on each vertex a long, tapering process or horn, tuberculated, brown-tipped, and marked in front by a reddish stripe which is extended down

side face to the ocelli; color of face and head yellow-green, the surface finely tuberculated. To next moult 6 to 9 days.

After Second Moult.—Length from .34 to .4 inch; same shape; color yellow-green; same tuberculated lines; head shaped as before, but narrower and higher, the horns longer, and nearer together; striped as before, but the upper part pink; color of face pale green. To next moult 14 to 18 days.

After Third Moult.—Length .55 inch; shape and color as at preceding stage; but a few hours after the moult, in nearly all the examples, the colors changed to brown and buff; at 24 hours from the moult, length .57 inch; on middle of dorsum a broad brown stripe, on either side of which is a band of reddish-buff, which changes to greenish on the outer side; on the side another buff band, through the middle of which runs a brown line; the basal ridge buff; head and horns as at preceding stage. A few days later the buff larvæ became lethargic.

But one of the green larvæ proceeded to fourth moult without change of color. From third to fourth moult in the fall, 26 days.

After Fourth Moult in Fall.—Length .6 inch; color green; but 24 hours after the moult had changed; color now yellow-buff and red-brown; the medio-dorsal stripe pale brown; the bands on either side of it greenish-yellow; the side brown with a dull green line running through it; head shaped as before; face green, the stripes reddish-brown. This larva went into lethargy a few days later, but died during the winter.

One only of three larvæ which hybernated after third moult survived the winter, and being placed in a warm room 15th Feb'y, soon waked up and began to feed. The color gradually changed from buff to green without a moult; color wholly dull green, with a darker medio-dorsal stripe; a yellow sub-dorsal line running from horn to tip of tail; two yellow side lines, obscure; yellow along base; tails green, no pink at tips; head pale yellow, the stripes brown. Twenty-two days after the end of hybernation, passed fourth moult.

After Fourth Moult in Spring.—Length .62 inch; color pale green, the medio-dorsal stripe dark; the sub-dorsal stripe yellow-white, the two lines on side, and the basal stripe same hue; tails green; head emerald-green, the horns reddish, the stripe down face dark brown. Duration of this

stage 30 days. After fifth moult, length 1 inch ; color green, striped with whitish. Twelve days later reached maturity.

MATURE LARVA.—Length 1.2 inch ; long, slender, the dorsum arched ; the last segment ending in two long, slender, conical tails, which are rough with tubercles ; each segment creased transversely so as to make six ridges ; the front ridge, from 3 back, is twice as broad as any other, and flattened, the rest nearly equal, rounded ; the surface finely tuberculated, each tubercle giving out a fine and short hair ; color of body green ; a darker medio-dorsal stripe, and on either side of this a pale green band on the outer edge of which is a yellow-green stripe ; these stripes and bands occupy the whole dorsal area ; on the side a pale green band through which runs a yellow line ; along base a yellow stripe ; feet and legs pale green ; head obovoid, the top narrow, and on each vertex a long, tapering, conical process or horn, the two meeting at base ; whole surface rough with fine tubercles, each with short hair ; color of head yellow-green, the horns red ; down the front of the latter from near the tip a brown stripe, which passes down the side of face to the ocelli.

The only larva I have been able to raise to maturity died before chrysalis, so that I am not at present able to describe that stage.

Canthus does not fly in W. Va., and I was indebted to Mr. Chas. E. Worthington, of Chicago, for the first eggs and larvæ I obtained. The eggs were laid by females tied in a bag over grass, 11th to 13th July, 1879. When they reached me, 20th, by mail, some eggs were still unhatched. In all there had been about 50. They were laid on a species of coarse grass growing near the border of Lake Michigan, but the larvæ eat lawn grass readily. The first moult was passed 27th July ; the second 2nd Aug., the third 16th Aug. ; but at each stage some larvæ lagged behind, so that the third moult came on at various dates up to 2nd Sept. The color of all the larvæ was green till after third moult, when the first which had passed that moult, within 24 hours after it, changed to buff and brown, and 31st Aug., these were evidently fixed for hybernation. But two which passed the moult latest went on to fourth moult, one of them having changed to buff like those first mentioned, and passed fourth on 19th Sept., the other retaining its original color. This last passed fourth on 17th Sept., and about 24 hours after, it also had changed to buff. One of these escaped, and the other went into hybernation, but died during the winter. I lost indeed all the larvæ of the brood.

On 25th July, 1881, I again received eggs from Mr. Wm. E. Gallagher, of Whitings, Lake Co., Ind. When I opened the box there were about 35 newly hatched larvæ. Another smaller lot came from same source 1st Aug. From one cause or other, the most efficient being minute spiders in the sod, and which I discovered only when too late, I had but 3 of these larvæ on 30th Aug., all past third moult. They retained their green color until a few hours after that moult, then turned buff. I sent one of these to Mrs. Peart, in Philadelphia. By 10th Sept., both my larvæ were in lethargy. I recorded on 19th Sept., that one of them had shifted its position. The same thing occurred 29th Sept.; and on 1st of Oct., the same uneasy larva left the grass and climbed four inches up the glass cylinder which covered it. On 12th Nov., this larva had moved again, and next on 4th Dec. Meanwhile the one which had been sent to Philadelphia behaved differently, and went on to fourth moult, passing it 27th Oct. One of my two died, but the other I brought into a warm room on 13th Feb. (temp. outside 65°), and placed in the sun. In about fifteen minutes it moved and soon after had eaten. When brought in, it was much shorter and smaller than when it went into lethargy. It had been .6 inch then in length, now it was less than .4 inch. By 25th Feb., it had reached .5 inch, and 2nd March had fully recovered its former length, .6 inch. Early in March, it began to change color, and by the 6th had become green. It reached .66 inch before it passed fourth moult, which occurred 24th March. The larva which had passed the winter in Philadelphia had escaped, and I sent this last survivor of the brood to Mrs. Peart. It passed fifth moult 25th April, and continued to feed, by the 7th May becoming full grown. After which it did not increase in size, seemed to be at rest all the time, and finally died 2nd July, before pupation. So that the egg which had been laid in the middle of July produced a larva which had not pupated 2nd July the next year. So protracted are the stages in several of the *Neonymphæ* larvæ that rearing them becomes excessively tedious, the more so as during the months when they are feeding they require daily looking after.

When at rest, the *Canthus* larvæ, as do those of all this genus, have their heads turned down and under, so that the horns are nearly in same plane as the dorsum, after the fashion of *Apatura* larvæ. When feeding, *Canthus* has the tails elevated at about 45°, and separated. They rested much on the glass cylinder at times, especially just before and during the moults, and spun for these occasions quite a web on which to support

themselves. When weaving, the larva made a circular motion with its head, all the time advancing slowly, and the result was a succession of loops like figs. 8.

I have now bred from the egg every species of *Neonympha* found east of the Mississippi River and north of Texas to the Rocky Mountains, in all cases but *Canthus* obtaining chrysalids. These species are *Eurytris*, *Sosybius*, *Arcolatus*, *Gemma* and *Canthus*.* Of *Henshawii* I received, in summer of 1881, eggs from Mr. Doll, in Arizona. They were dead, and no larvæ had been hatched. The shape of the egg was like that of *Canthus*, but there was a fine net work of lines over the surface, as in *Gemma*. In fact, the eggs of the six species spoken of are alike in shape, almost globular, flattened at the bottom, and all but *Canthus* show distinct reticulations over the surface. The larvæ fall into groups, *Canthus* and *Gemma* forming one, then *Arcolatus* one, *Eurytris* one, *Sosybius* one, this last coming nearest the true Satyrids (*Alope*, &c.). The heads of the young larvæ, from egg, are round, or truncated ovoid, and except *Sosybius*, all have processes on vertices at this stage. *Gemma* begins with a pair of high, divergent, conical horns. At first moult, these are of same description, but higher in proportion, and the horns are retained to last stage. *Canthus*, at first, has on each vertex a depression, and out of the middle of this rises a low cone. But at first moult, the larva takes on a pair of long, conical horns, and carries them through all stages. *Arcolatus* begins with an ovoid knob on vertex, and two others smaller down each side of face. At first moult, there is a low cone on vertex and those on face are suppressed. And essentially the same sort of process runs through all subsequent stages. In the last, it is small, short and pointed. *Eurytris*, at first, has a round head, shaped like a Satyrus, but on vertex is a rounded knob. After first moult the shape of head changes to the *Neonympha* type, sub-ovoid, truncated, and the knob is continued. Same in next two stages, but at fourth moult (and last) these processes are a little longer, pointed and compressed. *Sosybius* begins with a round head, no processes on vertex, and goes through all stages in same manner. *Canthus* and *Gemma* are long and very slender, and both change from green to brown when about to hibernate, and back to green again after the hibernation, and before a moult. *Arcolatus* also is long and slender. But *Eurytris* and *Sosybius* are stout, and more in shape like *S. Alope*. The

* All these have been described, as to their preparatory stages, in this magazine.

chrysalids of *Arcolatus*, *Eurytris* and *Sosybius* have the same general shape of *S. Alope*: stout and short, with the anterior end truncated, almost cut squarely off beyond mesonotum. But *Gemma* is long, slender, with the head case produced, and ending in two long conical processes like the horns of the larvæ. Probably *Canthus* will be found to have a chrysalis of this description. Debis *Portlandia*, in all its stages, comes very near *Neonympha*. In the first two stages it most resembles *Canthus*; after that, *Canthus* and *Gemma*. Its chrysalis is of the Satyrid type, very like that of *Alope*. The egg differs from all the species somewhat. It is of the same general shape, however, but has a rounded protuberance on the under side, and a smooth surface. Judging by the preparatory stages of *Portlandia*, Debis ought to stand next *Neonympha* in the catalogues, instead of being separated from it by several genera, as *Cœnonympha* and *Erebia*. The preparatory stages of these two genera I only know from European authors, but species of both have barrel-shaped, ribbed eggs, and caterpillars with round heads, and no processes on vertices. These agree, therefore, with *Satyrus*, and the genera should stand near *Satyrus*.

The more I see of the preparatory stages of butterflies, the more I am impressed that no system of arrangement is a true one which does not consider these. Each unquestionably natural genus in the American diurnals is as distinct in its several stages as in the imago, so far as these are known. Between such genera fall some others less clearly defined, with the stages spoken of lying midway between also; as *Euptoietia*, which has the egg of an *Argynnis*, but the chrysalis of a *Melitæa*, while the larva is neither one or the other, though resembling *Argynnis* somewhat.

THE NORTH AMERICAN SPECIES OF NEMISTRINIDÆ.

BY S. W. WILLISTON, NEW HAVEN, CONN.

The family of Nemistrinidæ comprises throughout the world one hundred and ten described species, six or seven of which are from Southern Europe and three from North America; the remainder nearly equally distributed in Asia, Africa, Australia and South America. In their habits, so far as known, the species approach the Bombylidæ most closely, as also do many in their general appearance. Structurally they are of interest to

the Dipterologist, on account of their intricate and diverse neuration, which in some species is almost Neuropter-like in the reticulation.

Doubtless the number of our species will be augmented by future discoveries, but yet we can never expect a very material increase.

Our three described species, to which I here add a fourth, may be diagnosed as follows. I have never seen Macquart's species, but it may be distinguished without difficulty.

A. Proboscis short, protruding but little from the opening of the mouth. Antennæ small, short, broadly separated; wings not reticulate, three submarginal cells, the outer posterior one closed before the border of the wing, first posterior cell open, fourth (the one just behind the discal cell) closed, anal cell narrowly open.

a. Eyes pilose, second posterior cell open.—*Hirmoncurea brevirostris*.

aa. Eyes bare, second posterior cell closed before the border of the wing.

H. (Parasymmictus) clausa O. S.

B. Proboscis long, directed backwards. Face without protuberance; antennæ small, short, very broadly separated, third joint nearly orbicular, style of three joints. Eyes bare, contiguous in the male; ovipositor of female with two slender diverging lamellæ. Wings not reticulate, three submarginal cells, the outer ones open, first posterior cell open, fourth closed, the anal cell open.

b. Third joint of antennæ nearly orbicular, or slightly pear-shaped, third joint of style not much longer than first two together; second posterior cell closed and petiolate. Abdomen indistinctly fasciate. Length 9 m.

Rhynchocephalus Sackeni, Wltn.

bb. Third joint of antennæ obtusely oval, third joint of style three times as long as first two together. Wings more slender, second posterior cell open. Abdomen distinctly fasciate. Length 12 m. *R. volaticus*, sp. nov.

Hirmoncurea brevirostris, Macquart, Dipt. Exot. Suppl. 1, 108, 8; Tab. 20, fig. 1. Yucatan. This species differs from the type of *Hirmoncurea* (*H. obscura* (W.) Meig.) in the pilosity of the eyes, and closed second submarginal cell. Baron Osten Sacken mentions (Cat. Dipt. note 142) that he had seen a specimen of *Hirmoncurea* from Colorado with the second posterior cell open. It is possibly this, but I suppose a new species.

H. clausa, O. Sacken, Western Dipt. 225, Texas.

Syn. *Parasymmictus clausus*, Bigot, Bull. Soc. Ent. Fr. 1879, No. 8; Annales 1881, p. 15.

The genus *Hirmoncura* has been used in a wide sense, but if such characters are made use of as serve to distinguish genera in allied families, most of the species would become generic types. The closed submarginal and second posterior cells in this species have induced Bigot to make it the type of a new genus, but the same reasons would require new generic names for *H. brevisrostris* and the species of *Rhynchocephalus* described below. For the present, therefore, I believe it will be better to hold *Parasymmictus* in abeyance.

Rhynchocephalus Sackeni, Wltn., Trans. Conn. Acad., vol. iv. p. 243, 1880.

Belongs in the division with closed second posterior cell, to which *R. Tauscheri* Fischer, the type, pertains. A male specimen from Washington Territory, since received, has the proboscis considerably shorter, the eyes nearly contiguous near the ocelli, ocelli with a conspicuous tuft of black pile and the style of the antennæ very indistinctly jointed, even under a compound lens.

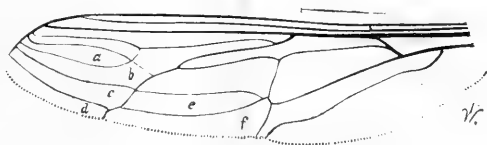


FIG. 4.—Wing of *Rhynchocephalus volaticus*, Wltn.—a, third submarginal cell; b, c, d, e, f, first-five posterior cells.

Rhynchocephalus volaticus, sp. nov.

♀. Black with light yellowish pile. Head brownish black, thickly clothed with pile. Front thinly blackish pilose on the upper part; on the lower part, the face, cheeks and occiput with abundant sulphur yellow pile; antennæ short, reddish yellow, first joint concealed by the pile, second joint sub-quadrate, third joint obtusely oval; first joint of style very short, second about twice as long, third joint three or four times as long as first two together. Proboscis reaching about to hind coxæ. Thorax brownish black, clothed with the same sulphur yellow pile, abundant and bushy on the pleuræ and pectus, on the dorsum thinner, the ground color

showing through. Abdomen short and broad, brownish black; second segment above thickly yellow pilose in the front part, behind more or less black, its hind border and the hind borders of the remaining segments conspicuously fringed with white tomentum; second, third and fourth with black somewhat intermixed with yellowish tomentum; remaining segments more or less clothed with yellowish pile, third and fourth segments on the sides with conspicuous tufts of black pile. Lamellae of the ovipositor slender, black, about as long as intermediate femora. Legs brown, femora concealed by abundant yellow pile, especially in the proximal parts, tips yellowish, hind tibiae and tarsi blackish. Wings hyaline, more slender than those of *R. Sackeni*, first and second submarginal, and first and second posterior cells open, third and fifth lying along the posterior margin, separated by the vein running into the posterior border. Length 12 m., of wings 11 m. Two specimens, Florida, Prof. Riley.

When denuded, the second and third segments of the abdomen may show a large reddish spot on each side; they are probably not, however, a constant mark. This species agrees with *R. caucasicus*, Fischer, in having the second posterior cell open.

The three other species of this genus now known are *R. Tauscheri*, Fischer, and *R. caucasicus*, Fischer, from Southern Russia and Asia Minor; and *R. albofasciatus*, Wied., whose habitat is unknown. That *volaticus* is not the same as *albofasciatus* seems evident from the description of the abdomen. The white fasciae are on the extreme hind borders, with the remainder of each segment black, while in Wiedemann's species the white fasciae are in front.

ON THE NORTH AMERICAN CALPINÆ TO HELIOTHINÆ.

BY A. R. GROTE.

Since the groups are very difficult of scientific definition in the *Noctuidæ*, the present must not be considered as standing on more than a comparative basis. In my New Check List the genera are arranged between the *Calpinæ* and *Heliothineæ*. The arrangement I would only modify by restricting the *Calpinæ* to the North American genera—*Calpe*, with one species, perhaps the same as the European, and *Phiprosopus*, with the species *callitrichoides*, called a Geometrid by Zeller, and which in outline has a resemblance to the aberrant Noctuid genus *Doryodes*,

which I have placed among the *Nonagriine*, or *Nonagriade* of Dr. Harris. The group which I have called *Stiriine* is in some measure intermediate between the *Calpine* and *Plusiine*. The fact that the tibiae are often armed with a claw (*Stiria. Basilodes*) may be taken as an approximation to the *Heliothine*, where the tibiae are usually armed and have the tibiae spinose.

The typical genus of the *Plusiine*, *Plusia*, has a wide distribution and is numerous in species. The type is the European *P. chrysis*, and we owe the generic name to Fabricius. I would refer the student to my Catalogue of May, 1874, where I have been at pains to give the date and the types of the genera then described. This labor will, I think, be found to have been well expended, and to afford a good and reliable basis for the generic synonymy. However we may extend or alter the contents of the genera, it is well to keep the real meaning of the generic names before us by a reference to the type. We can thus judge how far we are willing to depart from the typical structure for the purpose of getting good working genera. I add here the generic types since 1874 and arrange the genera as follows. I do not think the labial palpi of *Plusiodonta* are really intermediate in form between *Calpe* and *Plusia*, but it is not unreasonable to follow with that genus.

The two groups or sub-groups differ as follows: Front often prominent, rough, with a roughened projection, sometimes circular, cup-like, or hardly depressed, or with a central elevation; again with a superior ridge or a tubercle; labial palpi weak, with the terminal joint conical or concealed; abdomen smooth, untufted, often with exerted ovipositor. The infraclypeal plate is pronounced. *Stiriine*.

Front smooth, tibiae unarmed; palpi moderately long, with pointed third joint; vestiture more hairy; body often tufted on dorsal line. *Plusiine*.

a. *Stiriine*.

BASILODES Guen. (1852).

Type: *Basilodes Pepita* Guen.

Eyes naked, unlashd. Thorax quadrate; patagia deflected at tips. Vestiture consisting of hair-like scales, mixed with broader scales and with short, broad, underlying scales on thorax. Fore tibiae not truncated, with a single terminal claw; middle and hind tibiae unarmed. Body untufted; ♀ abdomen terminating in a somewhat sudden slope to the extruded ovipositor. Palpi hairy, projecting beyond the front, with conical third joint.

Clypeus full, rising to a black wrinkled protuberance, circular, a little depressed on top with the rim hardly raised. Wings of the usual *Plusia* shape, pointed at tips, and the primaries are rather broad, outer margin full.

1. *Pepita Guen.* West Virginia; Kansas.
2. *Chrysopsis Gr.* Arizona.

The first species is larger, fore wings metallic, golden, with fine ordinary lines; the latter paler, smaller, with a golden lustre over sub-terminal space. The relationship between this and the following genera is expressed by the fine oblique lines crossing primaries.

STIRIA Grote (1874).

Type: *Stiria Rugifrons Gr.*

Eyes naked, unlashd. Front with infra-clypeal plate noticeable and with a cordate impression having a raised tubercle, in the type near the lower edge, and in *Sulphurea* more central. Labial palpi with third joint concealed, less prominent than in *Basilodes*, from which this differs by the character of the frontal excavation. Legs unarmed, fore tibiae with a terminal claw. Wings wide with a *Plusia*-like tooth at internal angle of primaries. Thorax somewhat short and quadrate, like *Basilodes*, the tegulae a little more deflected at tips. The characters are fully given Bull. B. S. N. S., 73, 1874, where I failed to note its resemblance to *Basilodes* for the simple reason that I did not then know that genus. Both species are yellow with frosted purple patches and terminal space, the type larger and paler. *Sulphurea* intense yellow, somewhat more lustrous, smaller, and the purple patches hardly frosted.

1. *Rugifrons Gr.* Kansas; Colorado.
2. *Sulphurea Neum.* Arizona.

STIBADIUM Gr. (1874).

Differs by the infra-clypeal plate being more prominent, the labial palpi shorter. The clypeus is elevated and furnished with a moderate impression, more like that of *Basilodes* than *Stiria*. Like *Stiria*, the primaries are produced at internal angle, but the wing is a little narrower, with straighter costal edge than either of the other genera. The fore tibiae have a terminal claw; the eyes are naked and full. The characters separating these three genera are mainly comparative, and they may be optionally held to indicate groups in a single genus, which must then take the name of the first genus. The type is uniformly pearly fuscous and

looks a good deal like the common *Gortyna nebris*; in *Aureolum*, a much prettier species, the subterminal field is pale golden yellow and thus approaches *Stiria*; the ♀ ovipositor is exerted.

1. *Spumosum Gr.* Kansas; Illinois.
2. *Aureolum Hy. Edw.* Arizona.

FALA Gr. (1875).

Type: *F. Ptycophora Gr.* Proc. Ac. Nat. Sci. Phil., 425.

I have figured the single species in my Illustrated Essay, and the diagnosis is given as above.

1. *Ptycophora Gr.* California.

PLAGIOMIMICUS Gr. (1873).

Type: *P. Pityochromus Gr.*

Front with an empty and exposed cup-shaped protuberance, the frontal scales being short and mossy. A slender terminal claw on front tibiae. In *Tepperi* the frontal excavation is less prominent, but otherwise this species agrees. As compared with the preceding genera, the three species are slenderer and have a casual resemblance to the Heliothid genera *Schinia* and *Lygranthocia*. As in *Stibadium* the labial palpi are short, here they hardly reach the top of the more prominent infra-clypeal plate in the more typical forms. The species are olivaceous fuscous (*Pityochromus*, *Expallidus*), or of a delicate olivaceous green (*Tepperi*). Both Mr. Morrison and Mr. Smith wrongly give the fore tibiae of *Tepperi* as unarmed.

1. *Pityochromus Gr.* Mass. to Kansas and the South.

Schinia media Morr.

2. *Expallidus Gr.* Montana.
3. *Tepperi Morr.* Southern States, Arizona.

This genus may be considered as a division of *Basilodes* with the others which I have associated with it. The primaries do not show the tooth of *Stiria*. The course of uniting these genera seems to me not unadvisable, but the fate of one must be that of them all. Although the characters are principally the same and only offer comparative differences, allowing no value to the tooth or the modifications in shape of primaries, it is not a little singular that each has two or more species united by structural detail, general appearance, color and pattern, all, properly speaking, rather sub-generic than generic characters. The best marked seems to me *Plagiomimicus*, where the cup-like clypeus is rather narrower, much

exposed, and the infra-clypeal plate is prominent, not exceeded by the short labial palpi, and *Fala*, where the cup has a strong tubercle. *Basilodes* has the terminal palpal article conical and prominent, and apparently differs from the rest in this respect.

CHAMAEICLEA Gr. (1883).

Type: *C. Pernana* Gr.

Allied to the genera typical of the *Stiriinae* by the bulging clypeus and *Plusia*-shaped wings. Front with a slight depression, rising in the middle. Vestiture scaly. Tibiæ unarmed; in all the examples I have seen the fore legs are broken off. Fore wings wide, produced at internal angle. The tegulae are not deflected; the thorax short. ♂ antennae simple.

1. *Pernana* Gr. Arizona. This genus is curious for the way in which *Chamaeclea Pernana* mimics *Chariclea Delphinii*.

CIRRHOPIANUS Gr. (1872).

Type: *C. Triangulifer* Gr.

The eyes are full, naked, unlashd. The clypeus has a central rounded tubercle. The vestiture consists of hair-like scales with broader ones, arranged like shingles, rising from the thorax, which is short and in shape allies the moth to this group. The fore tibiae are also not truncate, but as long as in the preceding genera and unarmed. The parts of the thorax resemble the preceding genera, but there is a divided posterior tuft. The patagia are not as deflected as in *Plagiomimicus*, but do not lie close to the thorax. The female ovipositor is not exerted. The abdomen is untufted. The labial palpi have the terminal joint concealed and are not unlike though longer, the palpi of the genera separated here from *Basilodes*, but unlike that genus. The antennae have the basal joint scaled. The palpi are rather thickly haired. The tibiae are unarmed. Wings ample, without tooth, rounded exteriorly, with blunt apices, and running in a little and forming a prominent angle at internal margin. The genus seems to be somewhat intermediate between the preceding and *Plusia*. The species is golden-yellow with orange-brown lines disposed somewhat like the European *Chariclea Delphinii*.

1. *Triangulifer* Gr. Ohio, Missouri.

Pretiosa Morr. (*Chariclea*).

Figured in my Illustrated Essay under *Chariclea*. I believe that *Pyrrhia* of Speyer, Hubner and myself, of which the type is the European *Umbra*, and of which we have three congeneric American forms, *Exprimens*, *Angulata* and *Stilla*, is a different genus from *Chariclea* Kirby, of which the type I take to be the European *Delphinii*. I originally referred the moth as allied to *Gortyna*, and it may yet be better placed there when its early stages are known.

ACOPA Harvey (1875).

Type: Acopa Carina Harvey.

In this genus the body is linear and slight, the tibiae unarmed, ocelli small, male antennae brush-like with distinct joints, thorax with a tuft behind (in which it resembles the Heliothid genera *Oxyenemis* and *Triocnemis*), abdomen untufted, linear. The neuration is somewhat distinctive. Fore wings 12-veined with accessory cell, from the outer apex of which spring veins 7 and 8, 9 out of 8, a long furcation to costa. Hind wings 7-veined; median 3-branched; 8 out of 7 not far from the base. The legs are slender, tibiae unarmed. Dr. Harvey gives the characters in the Buffalo Bulletin, and figures the type from a Texan example. The species are white, hoary or pallid. I have seen the type of *Incana*, which is sufficiently distinct in appearance, but from its vague markings looks like some suffused varieties, as for instance, var. *Planus* of *Anytus Sculptus*. *Carina* is the smaller species; the type had the secondaries dark fuscous, but another specimen was paler. *Perpallida* is much stouter, the lines different, and it differs structurally in the smaller accessory cell on fore wings. It is chalky white, shaded with ochrey, and with narrow fuscous lines, the median farther apart than in *Carina*.

1. Carina Harvey. Texas.
2. Perpallida Gr. Kansas.
3. Incana Hy. Edw. Arizona.

(To be Continued.)

MEETING OF THE ROYAL SOCIETY OF CANADA.

A meeting of the above Society is to be held in Ottawa on the 22nd inst., when it is expected that many valuable papers will be presented. The Royal Society having honored the Entomological Society of Ontario by placing its name on the list of Societies who may send a delegate to take part in the proceedings, the Council have chosen Mr. James Fletcher,

of Ottawa, as the representative of our Society. We would call attention to the following letter from Mr. Fletcher:—

MY DEAR SIR,—Having been honored by the Council of the Entomological Society of Ontario by being nominated as the delegate to represent that Society at the approaching meeting of the Royal Society of Canada, I shall feel obliged if any members who are desirous of availing themselves of the privilege extended by the Royal Society of having papers read before that learned body, will correspond with me without delay, so that I may make the necessary arrangements.

I am, my dear sir, yours truly,

J. FLETCHER.

OBITUARY.

It becomes our painful duty to announce the death of one of the founders of our Society and its first President, Prof. Henry Croft. He died at Hermanitas, Texas, on the 28th of April, of dropsy, aged 63 years. Ever since the organization of our Society he has taken the deepest interest in its welfare. Early in life while in Europe he was an ardent collector, devoting most of his attention to Hymenoptera; but after accepting the position of Professor of Chemistry in the University of Toronto, which he filled with much credit for many years, his time was so fully occupied with his professional duties as to leave him but little opportunity for entomological pursuits. Yet he never lost his interest in this, his favorite department of natural history. For many years past his eyesight had failed to such an extent as to prevent his collecting, and his health also was too poor to permit of it. Several years ago he resigned his position in the University and removed to Texas with his family, with the hope of benefiting his health. His death was quite unexpected. One of his much esteemed colleagues thus writes of him: "His last letter to me, written about ten days before his death, showed much of his old interest in natural history, some of his familiar humor, and a kindly interest in his friends here. I look back with pleasure on many years of work with him as a colleague. I ever found him genuinely straightforward, guileless and upright." His memory will ever be cherished by those of us who knew him well as a kind and disinterested friend.

CORRESPONDENCE.

Although the snow still heavily shrouds the earth, and the air is frosty, the stern, cold sway of winter must soon be ended, and naturalists will again go forth into the fields and forests. Before entering, however, on the coming campaign, I would like to record for my fellow collectors a few facts culled from my copious notes of the past one. The spring of 1882 was very backward, so that insects were unusually scarce during April and May. On the other hand, the autumn was prolonged and fine, and many species could be collected up to the end of October. On April 25th, I carefully searched the pines for Buprestidæ (which at the same date in 1881 were abundant), but could not find a single specimen. On May 11th, a second investigation resulted in the finding of only two specimens of *Chalcophora liberta*, Germ. On June 6th, this species was abundant, and several specimens of *C. virginiensis*, Dr., and *Chrysobothris Harrisii*, Hentz, were also taken. *C. virginiensis*, Dr., *C. liberta*, Germ., and *C. fortis*, Lec., were taken again on several days between September 24th and October 16th. On April 30th, Tiger Beetles were making their appearance, and some specimens of *C. vulgaris*, Say, were taken just emerging from their winter quarters in the sand, under stones and chips. *C. sex-guttata*, Fab., as is well known, frequents paths and clearings in woods. On wet or dull days it may often be found sheltered under the loose bark of fallen trees, or in the deserted burrows of borers, down which it retreats when disturbed. While stripping the bark from a large prostrate maple on May 22nd, to obtain larvæ, I captured three of these beautiful beetles, which had thus been driven to shelter by a shower. The tree yielded numerous specimens of *Eupsalis minuta*, Drury, and some pupæ of *Saperda tridentata*, Oliv., from which imagos emerged on June 15th. On June 16th, while beating the branches of a butternut, I found upon my net a Curculio (blackish with an oblique white dash on each elytron), which was new to me, but could find no more upon the tree. As I was leaving the field in which it stood to enter an adjoining wood, I saw upon the gate-post a similar weevil, and a glance around showed me a large butternut growing but a short distance away, and having a large dead limb resting on the fence. I at once concluded that the weevils had come from this, and, on examining the decaying limb, hundreds of the beetles were found upon it. On a length of only five or six feet I took fifty, nearly all of which were paired and copulating. The beetle proves to be *Pseudomus truncatus*, Lec. On the 21st I took two specimens of *Cepha-*

loon lepturoides, Newm., as well as several of *Dendroides concolor*, Newm., and other fine species. Among the beetles mentioned by Dr. Le Conte as bred from hickory twigs, is *Chariessa pilosa*, Forst. During the latter part of June and the following month numerous specimens of this handsome beetle were observed upon felled and old hickories. They were very active,—coursing about in search of prey, and doubtless destroying many insect enemies of this tree. One was seen devouring an *Agrilus egenus*, Gory, and a second feasting on *Magdalis barbata*, Say, both injurious and abundant species. The delicate and rare Buprestis, *Pucilonota cyanipes*, Say, was captured on June 22nd, upon a dead willow, which I hope may yield me more during the coming season. On the same day a very fine female *Bellamira scalaris*, Say, was taken ovipositing on an old maple stump. Beating low bushes on the margins of a small lake yielded numerous species, including *Cupes concolor*, Westw., the only specimen of this family which I have yet taken. During September the Locust-borer, *Cyllene robinia*, Forst., was very abundant in all parts of the city. Although I had never previously captured the beetle, I knew from the decayed condition of our locust trees (which are not numerous), that it must infest them. In the latter part of the month, *Ecanthus niveus* was, as is usual, in large numbers on raspberries, and in full song, if we can so designate its musical performance. An interesting feature of its concerts is one of which I have not been able to find any mention in books accessible. While the male is energetically shuffling together its wings, raised almost vertically, the female may be seen standing just behind it, and with her head applied to the base of the wings, evidently eager to get the full benefit of every note produced. On October 7th, I discovered in the seeds of the basswood some lepidopterous larvæ of which I would be glad to hear from members studying lepidoptera, as I can find no mention of any moth attacking the fruit of this tree. Do the larvæ leave the seeds, and, as they have the power to do, lower themselves to the ground, or do they remain until the seeds fall from the tree? The seeds are completely eaten out, and I noticed in a double-seeded fruit that after finishing one seed, the larva proceeded to the other.

Ottawa, 30th March, 1883.

W. HAGUE HARRINGTON.

P. S.—I would like to obtain, by exchange or purchase, a copy of the First Report of the Society, to complete my set of its publications.

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No. 5

INSECTS INJURIOUS TO DRUGS.

BY WILLIAM EDWIN SAUNDERS, PH. G.

[From an Inaugural Essay presented to the Philadelphia College of Pharmacy.]

In this paper is given simply what has been noted by the writer during a study of these insects extending over more than a year.

Sivodrepa panicea.—This is the elliptical, reddish-brown beetle, about one-eighth of an inch long, which is found in almost every edible drug, and in some, such as aconite root and capsicum, that would be pronounced far from edible. In addition to these two drugs, I have found it in bitter almonds, sweet almonds, angelica, boneset, calumba, chamomile, chocolate, coriander, dandelion, elm bark, ergot, extract of licorice, German chamomile, orris root, prince's pine, rhubarb, squill, and sweet flag.

The larva is white, with a brown head, is about twice as long as the beetle when full grown, although it is seldom or never seen stretched out at full length, always remaining curled up in a ball. It will in time fairly honeycomb a piece of root with small holes about one-twenty-fifth of an inch in diameter, at the end of which it is generally to be seen at home. Under the influence of camphor, these larvæ become uneasy, but being apparently unable to crawl away, resign themselves to their fate, and seem to thrive just as well with camphor as without it.

Calandra remotopunctata.—This is a small, black beetle, about the size of the last, with what is popularly termed a "snout," projecting from the front of the head downwards. Under the microscope the back, thorax, and head are seen to be finely pitted, giving the insect a rough appearance. It was found in large numbers, the larva feeding on pearl barley, inside of which it lives, the egg being probably laid in the grain by the parent, and on hatching, the little insect makes its home there, eating all but the shell, and sometimes attacking the grain from the outside.

Tenebrioides mauritanica, a species of "meal-worm," was found in pearl barley, and one specimen in calumba. It is a dark brown beetle.

five-sixteenths of an inch long, the head and thorax forming nearly half the total length, and the mouth being fringed with hair. The back, which at first sight appears perfectly smooth, proves to be, when examined under the microscope, longitudinally corrugated. The larva is nearly half an inch long, white, with a brown head, and between the jaws is a row of hair as in the perfect insect. The posterior end is furnished with a pair of claspers.

Trebolium ferrugineum is a flat, reddish-brown beetle, about one-eighth of an inch long, appearing smooth to the naked eye, though the microscope shows the back numerous pitted. These insects affect patent foods and similar substances, and the beetles are possessed of remarkable longevity, as proved by the fact that I have kept a few alive for two months in a small box with a little ceralina, which seems to be their favorite food. Whether the beetles themselves eat it or not I do not know, but they certainly have a liking for the dead bodies of other beetles.

Silvanus surinamensis is a narrow, brown beetle, almost one-eighth of an inch long, with a pitted and longitudinally corrugated back. One specimen only was found, on anthemis.

Anthrenus varius.—This insect has been found only in cantharides, but I believe, also attacks other animal drugs, such as castoreum. During the month of July there emerges from the egg a very active larva, densely covered on the tops of the segments with stiff brown hairs, which, at the posterior end, point towards the centre of the back, forming a ridge, and when the insect is annoyed, it has the power of dividing the ridge in the centre and throwing it down on each side in a fan-like position, the object of which movement could not be determined. When the insect has been feeding on the whole cantharides, all these hairs on the back become rubbed off, those forming the ridge being generally last to go, because, being on the downward slope of the body, they are not exposed to the same amount of friction. Underneath, however, the hairs are shorter, and do not become rubbed off as on the back.

The larva consists of eleven segments, those at the ends being of a much deeper brown than those towards the middle, and the six legs being inserted on the three anterior segments, each furnished with a short, straight claw. The skins are shed quite often during the larval state, and are discarded by a slit nearly the length of the back, terminating indifferently at either end, and through which the insect emerges. The shed

skins present a beautiful iridescent appearance under the microscope when viewed by reflected light.

These larvæ feed on the cantharides all winter, and if in quantity, commit great havoc, leaving only the hard exterior portions untouched, such as the upper portion of the thorax, the green wing cases, and transparent wings. When their legitimate food gives out they have no compunction about first eating their dead parents, and then each other, but on this diet they do not seem to thrive so well.

The beetle emerges in May or June, and is about one-eighth of an inch long, oval and black, the upper parts being marbled and streaked with whitish and rufous, which are rubbed off after death if the insect is subjected to any rough usage.

Camphor does not kill these larvæ, and after keeping some for a day in a small box about a quarter full of camphor, the only thing worthy of remark in their actions was that they did not seem quite so lively as those kept without it. That they have a distaste for it, however, is proved by the fact that some which were put in a box with holes in it, left the box during the night. The Pharmacopœia direction to keep camphor with the cantharides is, therefore, not a *remedy*, merely a preventive measure, and not a very good one either. The vapor of chloroform rapidly kills them, so that by putting a small quantity of chloroform in a gallipot on the top of the infested cantharides, the heavy vapor will sink through it and destroy them.

NOTE.—The essay was accompanied with specimens of the larvæ, skins and beetles, mounted for examination by means of the microscope.

THE PARASITE OF PHYLLOXERA VASTATRIX, AND THE GALL INSECT OF THE NETTLE TREE.

BY REV. THOMAS W. FYLES, COWANSVILLE, P. Q.

Upon request, I sent to Dr. H. A. Hagen specimens of the parasite of the Phylloxera, *Diplosis* (?) *grassator*. At the same time I sent him specimens of the *Psylla* described on page 198 of vol. xiv. Dr. Hagen favored me with information as follows:—

“The fly is a *Cecidomyia*; I think it is not sure that it belongs to *Diplosis*. At least the reticulation of the wing differs in having the

median vein straight, and the fork at the hind margin wanting. You will see in Osten Sacken's Catalogue that the museums do not possess this type for *Cecidomyia*. I have gone through the literature, and find till now your species is not described. The larva is shrivelled up, therefore the trophi are not visible.

"Your other insect is *Psylla venusta*, O. Sacken, raised by him, and described with its galls on *Celtis occidentalis*.—Fettner Entom. Zeit., 1861, p. 422."

With regard to the *Psylla*, Mr. Fletcher's note in the February number reminds me that I ought to have mentioned that I found *Celtis occidentalis* at Como, in Vaudreuil Co., in the grounds of Mr. I. J. Gibb, with whom I spent some time last year. I have not met with the tree at Cowansville.

In Mr. Ashmead's list of described Psyllidæ, on page 222, vol. xiii., there is no *Celtidis-mamma*. And the doubt remains whether the *Celtidis-mamma* of Prof. Riley is not the insect previously described by Osten Sacken under the name *venusta*. Professor Riley seems satisfied that they are distinct species; and it would be pleasing if we could regard him as infallible.

Where does the Professor obtain the word *Celtidis*? The generic term *Celtis* is obtained from the name of the African lote-tree, mentioned by Pliny, H. N. xiii., 17 in § 32: "Africa arborem loton gignit quam vocant celtin et ipsam Italiæ familiarem." *Celtin* indicates *Celtis* as the genitive, and not *Celtidis*.

MR. JOHN B. SMITH'S PAPER ON N. AM. HELIOTHINÆ.

BY A. R. GROTE, A. M.

For my part, I am very glad that a plate of tibial structure has at last been published, and by Mr. Smith. It illustrates characters upon which I have long insisted, and is a valuable addition to the present "Synopsis." The second plate might well have been omitted; it hardly assists the student, and is badly drawn. The "Synopsis" itself is a gratification to me; it is scientifically written so far as the characters it discusses are concerned. Its difference from my own work in its conclusions are more apparent than real. Mr. Smith writes with a critical eye to my shortcomings, and really finds very little to say.

He quotes at some length a former statement of mine as to the spinose tibiae (made ten years ago), which I at once corrected on examining again the small insect under a larger lens. But he excuses other modern writers with worse mistakes to father. In stating the case fairly, he should have said that although Mr. Grote has been the first American to insist on the natural characters of spinose tibiae, yet once he called the tibiae unarmed, where they were really spinose, but he promptly corrected the mistake. Mr. Smith calls my citing *Rhododipsa volupia* hardly "honest," while he suppresses the fact that I twice described the moth as probably Fitch's species, but Fitch's description, as I explained, will not fit my insect (figured in Illustrated Essay). In my list I only did to this *one* what LeConte did throughout, viz., cite the authority for the combined terms. I differ from Mr. Smith as to the generic characters, and I desired to show that no new specific name was necessary, even if my species was not Fitch's. With regard to the species, there is little variance with regard to their validity. The synonymy is mainly that of my Lists. I do not believe that *persimilis* is the same as *villosa*; at the same time I readily admit that *balba* and *acutilinea* may be color forms of *separata*. Speyer considers, as I do, that *angulata* is distinct from *umbra* (= *exprimeus*). Mr. Hy. Edwards informed me long ago that *sueta* and *Californiensis* were varieties. The statement made by Mr. Smith that I resurrected *Trigonophora* from Hubner, is incorrect. I took the genus from Lederer and Staudinger. I cannot understand why it is that *Schinia* Hubn, which I did "resurrect," is made to supercede my genera; but I scarcely think that any one will call all the species "*Schinia*" that Mr. Smith puts under that genus. I can assure Mr. Smith that my little *limbalis* is not related to Mr. Edwards' *constricta*. From a small unset specimen I established the genus *Epinyctis*, without knowing of Mr. Hulst's description of the moth as *magdalena*. The two, as Mr. Hy. Edwards has told me, are the same. My specimen was very poor, and I have it no longer to again go over its characters, which are, I believe, correctly given by me. The collections I have determined will allow of every certainty as to my species, but I hope that my labels will be respected and not changed, as it is probable that Mr. Smith's work will be modified. It is interesting as the first attempt to review from a scientific standpoint the material brought together by myself, and which there was frequently no opportunity to compare at the time of the original description of the species and genera.

SCHINIA Hubn. (1818).

Type: *S. Trifascia* Hubn.

The fore tibiae are short and stout, on the inside with a longer terminal claw followed by two unequal spinules; on the outside and shorter edge with two smaller sub-equal claws, the second the shorter, and a third, farther removed, between a spinule and a claw, a short broadish spinule. Front bulging, narrowly scaled, with infra-clypeal plate, no frontal tubercle. Eyes naked, unlashd; ocelli. Labial palpi slender. Vestiture mingled scales and hair. Middle and hind tibiae spinose. Abdomen untufted.

Neither *Rectifascia* nor *Gulnare*, which resemble each other in markings, probably belong here; the latter I have never seen; the only specimen of the former which I found in Mr. Neumoegen's collection has the legs defective, the tibiae not being spinose as far as I can see. The student is referred to my List (1874) for the types of the North American genera of Noctuidæ.

LYGRANTHOECIA G. & R. (1873).

Type: *Anthoecia Rivulosa* Guen.

Fore tibiae with fine spinules on the inside, which is furnished with two sub-equal claws; on the outside with a succession of four in diminishing series from the end of joint. Tibiae spinose. Vestiture mixed scales and hair. Eyes naked, unlashd. This genus differs by the armature from *Schinia*, but the frontal structure is the same. I may be wrong in considering the variations of tibial armature to be of generic value. I was at work on Mr. Neumoegen's collection, and had reached in part similar conclusions with Mr. Smith, who uses exactly the characters I do. It is a mistake to suppose I had reviewed all the genera in my List. I merely gradually added the new forms. I shall again refer more fully to Mr. Smith's interesting paper.

NEW SPECIES AND NOTES ON STRUCTURE OF MOTHS AND GENERA.

BY A. R. GROTE, A. M.

(Continued from Vol. xv., Page 31.)

VANESSODES FUSCIPES, n. s.

♂. Allied to *Clarus*, but the body entirely griseous, concolorous with the fuscous gray wings, which are sub-diaphanous and differ only from

those of *Clarus* by being a little wider, more irrorate and dusted by dark scales. Same size as *Clarus*, but easily separated by the abdomen not being yellow. One specimen. Coll. B. Neumoegen, Esq. Arizona. The antennæ are not so heavily pectinated. There are no perceptible marks on the wings, which are not exactly of the same shade as those of *Clarus*, being more grayish.

CYMATOPHORA (BOARMIA) DEPRIMARIA, n. s.

♂. While *C. Dataria* resembles our Eastern *C. Larvaria* in the course of the outer median black line, *Depromaria* has it more oblique and straighter, more like *Pampinaria*, and this new species is much smaller, but of the same form as *Dataria*. Pale gray with the discal ringlets small. Lines narrow, black; outer line followed by a brown band, diffuse and even inferiorly, opposite cell, waved. S. t. line whitish, scalloped. Inner median line and median shade and outer median line running close together, a little confused and sub-parallel inferiorly at the middle of the wing, owing to the obliquity of the lines and the projection of the inner line. Hind wings like primaries, the mesial lines divergent superiorly, the outer followed by a brown shade. Body gray; a mark on collar. Beneath the wings are paler, mottled, without lines and the four dark discal dots perceivable. *Expanse* 26 mil. Arizona.

In ♂ *C. Dataria* the body is stouter, the mark on collar plainer, the disk of thorax somewhat blackish or smoky. The t. p. line is thicker, everywhere distinct, running obliquely outwards and downwards opposite the cell, below which it is sinuous, projected about veins 2 to 3; the brown shade is also uneven; the discal spot is larger on primaries, white, narrow and long; the scalloped s. t. line is more distinctly white on both wings. Beneath pale gray with a thick mark on fore wings and a very slight one on secondaries; there are traces of darker transverse lines. *C. Dataria* expands 30 mil. In this latter the fine median shade is sharply angulated beyond the discal ringlet. I do not think it will be difficult to separate these two Western species from their congeners.

PAPILIO WALSHII AND ABBOTII, EDW.

BY A. H. MUNDT, FAIRBURY, ILLS.

There seems to be a great lack of historical knowledge about the above insects in this State, at least as far as my observations are concerned. In

several collections, even in that of the State Normal, have I found *Papilio telamonides* labeled *Walshii*; this, however, was in the year 1878 and '79.

Subsequent observations will show that it is no wonder that this insect has escaped the notice of many of our best collectors.

Late in March, 1878, while walking through a thirty-five to forty-acre Pawpaw grove, near Pontiac, Ills., one bright and sunny morning, the ground being thinly covered with snow, which was rapidly disappearing under the influence of the sun's genial warmth, Mr. W. H. Story and myself were surprised to see a *Walshii* flying up; but the air being cool, it soon alighted and was taken by us, a perfectly fresh example. In the afternoon two more were taken, and on every bright day up to near the middle of May we could have taken fresh examples of *Walshii* and *Abbotii*; after that *telamonides* made its appearance and *Walshii* became scarce, but I might mention here that in every five examples I have ever taken, at least two were *Abbotii*.

In 1879, the river had flooded this entire ground, and not one of the latter insects were found by us there; but, on a high piece of ground some three miles from Fairbury, I found Pawpaw timber in patches scattered here and there for over a mile, where I took a few specimens of the latter two varieties, but they were very scarce, and most of those taken later on were *telamonides*.

In 1880, Mr. Story saw and took several of these *Papilios* at Pontiac, and I took quite a number, but they did not appear then until early in April. A remarkable connection between *Walshii* and *telamonides* was observed that year, more than before or since; at least half of the first that appeared were in size and wings real *telamonides*, but the tails were decidedly *Walshii*, and in some of these the tails were in length and shape like *telamonides*, but had the end only tipped with white, as in *Walshii*. *Abbotii* too were as much mixed, and the greatest variations in the extent of the red stripe on the upper secondaries existed in them. On writing these observations to Mr. Edwards, he decided that all of those with the least red on secondaries, forming a stripe, must be *Abbotii*, and suggested that I should publish my observations.

It will be remembered that during the winter of 1879 and 1880, the snow fell heavily and lay all winter until the warm spring rains melted it; and though it was bitterly cold that winter, the ground where the snow had laid had not been frozen. This might have had some influence on the above variations.

The spring was very late that season when most of these *Papilio*s appeared; the buds were just beginning to show signs of forthcoming leaves, but on these and the branches were deposited numbers of eggs, chiefly on the latter. It is rare to find any on the branches when the leaves are well out.

In 1881, the Vermillion River again overflowed the grounds at Pontiac, but the closest observations here at Fairbury, and at Pontiac, failed to show us a sign of *Walshii* or *Abbotii*; even *telamonides* was very scarce that season, but *marcellus* was quite plentiful from late in May throughout the season, but were much smaller at first than those of previous seasons or those coming later.

In 1882, the weather was very unfavorable for these insects, and but few *Walshii* were seen. Mr. Story took a few at Pontiac, and I secured several about the same time; even the most common form, *marcellus*, was very scarce. I visited quite a number of Pawpaw groves, including the extensive bottoms near the Illinois River, but I could see no signs anywhere of larvæ until the latter part of the season, when I found eggs on the young leaves of their food plant, and after that the leaves showed here and there where the larvæ had been at work, which in previous seasons could be seen throughout the warm weather.

Mr. W. H. Edwards had written me two years before this, saying that "the late Benj. D. Walsh had told him, before his decease, that the butterfly named in honor of him was not found in this State," and Mr. E. expressed the opinion that it was because no one had discovered how or when to look for it.

It is therefore no wonder that this insect should have escaped the notice of other collectors, when such an enthusiast as our honored and lamented Prof. B. D. Walsh failed to find it.

The parasites I have found infesting *P. ajax* are a black ichneumon fly, rather large, belonging to the genus *Anomalon*, and another, perhaps a little smaller than the above, with a yellowish brown body and black shiny wings, *Trogus excorsius*, Brull., species kindly identified for me by Prof. C. V. Riley.

OBSERVATIONS ON *ANTHRENUS VARIUS* FAB., *ANTHRENUS*
MUSÆORUM LIN., *TROGODERMA ORNATA* SAY,
AND *SITODREPA PANICEA* LIN.

BY JOHN HAMILTON, ALLEGHENY, PA.

ANTHRENUS VARIUS Fab.—Entomologists generally are well enough acquainted with the appearance of this insect, and but too well with the work of its larvæ ; but as to the time required for its development there is not the same unanimity of knowledge,—some stating that it requires a year for its various transformations ; others, that only a few weeks are necessary. The following is my experience : May, 1879, I placed a female in a paper collar box with some refuse Coleoptera and Lepidoptera. This box stood on the mantel-piece in my office, and consequently the temperature was nearly uniform summer and winter. An examination two months afterwards revealed several small larvæ. These were inspected monthly, and appeared to have attained their growth by the 1st of December, though they remained active during the winter. The first pupæ were observed March 5th, and the first beetle on the 26th. From that time to May 1st thirty-five developed in all,—the product of this one beetle. Three females and two males were left in the box, and six weeks afterwards young larvæ were observed. They were inspected monthly, and followed the same course as observed the previous year. From April to May, (1881), seventy-five beetles were taken from the box. How many were left is unknown. The box was closed, and several months afterwards was found to be inhabited by countless multitudes of half-grown larvæ. These disclosed, as before, during the following April, (1882). The beetles and cast-off larvæ skins nearly filled the box, and the original food was reduced to a powder. They were numerous enough to have supplied all the cabinets on the globe. Box and all were consigned to the flames. This experiment shows that this insect is moderately prolific ; that it is annual, at least in this instance ; that it does not require water ; that it can be propagated indefinitely without the male and female resorting to the open air, or tasting the sweets of flowers ; and that the larvæ do not seek to escape from confinement by gnawing out. Experimenters should use two close fitting telescopic boxes of different sizes, one within the other, so as to prevent any possible escape of the larvæ.

ANTHRENUS MUSÆORUM Lin. (*Castaneæ* Mels.)—This beetle is abundant in May and June on many flowering shrubs, especially *Spiræas*. In May, 1881, also in May, 1882, a number of these beetles were placed in a box containing refuse insects, as had been done with *Varius*; but in neither year did larvæ appear. In Europe this beetle has a bad record as a museum pest. (hence its name): but in this country I have seen no notice of such a habit. If *Musæorum* and *Castaneæ* are identical, it is strange how its taste has changed so completely; and it would be interesting to know whether it has been imported, or is a native of both continents. In the latter case its European taste for natural history has probably been acquired. However, may they not really be different species having forms so nearly identical that the anatomical differences of structure have not yet been observed, as was the case formerly with several much larger beetles, notably several species of *Lachnosterna*, *Cyllene pictus* and *robinæ*, &c.?

Further experiments are contemplated with this species.

TROGODERMA ORNATA Say.—April, 1879, found a full-grown Dermestoid larva in a large insect-proof show case in my office. Length, 6 mm.; shape, elongate, fusiform; color, pale, except last three dorsal segments, blackish. Placed it in an empty wooden box that had contained petroleum ointment, giving it a couple of insects for food. Monthly inspection showed that it ate nothing; that it moulted frequently and became smaller. It died July, 1880, having shrunk to one-fourth its original size. Fifteen skins, some of them exceedingly thin, were taken from the box, showing that it had moulted once a month. In May, 1881, five full grown larvæ, corresponding to the above, were found in the same case, having evidently lived on flies that had entered at such times as it had been opened. These were placed in a new ointment box, turned from poplar (*Liriodendron tulipifera*), the sides of which were one-eighth inch thick. Inspecting them two weeks afterwards, two were found to have escaped by gnawing oval holes through the sides of the box close to the top. The third had almost completed another hole, while the remaining two had not commenced operating. These three were placed in the petroleum ointment box above mentioned, and made no attempt to gnaw out,—the petroleum probably rendering the wood unpleasant to their taste. Seeing that they moulted as the former had done and that they were not likely to develop, they were placed in a wide mouth bottle

containing some fresh clay, and corked up. They at once entered the earth, and in sixteen days, (June 20th), appeared as beetles, proving to be *Trogoderma Ornata*—all females. From these experiments it appears that this insect is annual; that the larvae enter the earth to develop, and that to escape from confinement for this purpose they have power to gnaw through a considerable thickness of wood. And further, that in case they are prevented from entering the earth, unlike the larvae of many Lepidoptera, they do not pupate, but continue to moult monthly for an indefinite period, perhaps a year, before dying.

SITODREPA (*Anobium*) PANICEA Linn.—This insect appears to be omnivorous. Rev. Wm. Kirby states that its larva has been found in *Cantharis vesicatoria*; Dr. Geo. H. Horn, that it will breed in and destroy the cork in insect boxes. That it is likely to become more than an accidental museum pest is scarcely probable. But where so circumstanced as to be compelled to choose between cork and insects, the latter are most decidedly preferred.

My boxes are double, and lined with half-inch cork, which before papering is saturated with an alcoholic solution of corrosive sublimate. One box having escaped this treatment, on opening it last spring (1882), several of these beetles were found, having been bred in the cork. They were removed, and on one side of the box were pinned against the bottom several cards with duplicate beetles attached; the other was occupied by larger specimens mounted on pins.

During the summer, whenever opened, a number of the insects in question were picked out. About a month ago, on removing the duplicates, so as to treat the cork with the poisoned alcohol, the discovery was made that they were infested with the larvæ of *Panicea*, and completely destroyed. The larger beetles sometimes contained five or six grubs, each. They were in all stages of growth, from pupæ to larvæ apparently just hatched. The time required for development is unknown, but there seems to be at least two broods in the year in confinement. It may not, like *Anthrenus*, enter a collection from an appetite for insect food; but if imprisoned without way of escape, my experience shows the result will be the same.

American Natural History literature is somewhat barren in regard to such a common and obtrusive pest.

Say describes it by the name *Anobium tenuestriatum*, Say's Ent. Lec. Ed. ii. p. 281. He says it is common, frequently occurs in museums, is destructive to Iris root of the shops, and to various farinaceous substances. Melsheimer describes one of its forms by the name *An. obseum* [obesum], without remarks. Proc. Acad. Nat. Sci. v. ii., p. 309. LeConte says, "It has been introduced from Europe in flour, bread and other articles of commerce, to all parts of the globe," ib. 1865, p. 229. Packard mentions it as parasitic on *Humble Bees*. Guide to the Stud. Ins. p. 131; and at p. 471 figures the pupa and describes the larva. Mr. Townend Glover, (Agricultural Rep. 1854, p. 72), represents it as occurring in all its stages and in great abundance in soft wheat from Algeria, "several larvæ sometimes found inhabiting the same grain." And on plate (5) figures the larva, pupa and perfect insect. I know of no other notices, except that of Dr. Geo. H. Horn, referred to above.

NOTES ON THE TINEIDÆ OF NORTH AMERICA,
BY LORD WALSHINGHAM.

(From the Trans. Am. Ent. Soc., Philadelphia.)

BY MARY E. MURTFELDT, KIRKWOOD, MO.

Through his Lordship's kindness, I have received, with much pleasure, a copy of the above named *brochure*. From such examination as I have been able to give it, it seems to me by far the most valuable of recent contributions to the literature of American *Tineide*, and places all students of this beautiful group of the "Micros" under special obligations to its distinguished author.

The material examined in the preparation of these "Notes" consisted mainly of the loaned collections of Profs. Fernald and Riley, that of the Peabody Academy of Sciences of Salem, Mass., of Mr. Goodell, of Amherst, Mass., and a small contribution by the present writer. Each of these lots contained some of Mr. Chambers' types. The only American collections of any note which were not represented were those of the Harvard Museum at Cambridge, Mass., and the Clemens' types at Philadelphia. Of the latter, however, Lord Walsingham had full notes made during his visit to this country in 1872.

The result of the author's critical study of the specimens thus accumulated, has been the rectification of the synonymy of a large number of species, the characterization of one new genus, *Eulepiste*, and the description of twenty-four new species, some of which had been confounded with others previously described.

Clemens' genus *Anaphora* is required to give place to the earlier generic name *Aerolophus* of Poey, to which Walker's genera *Zaruma*, *Ubara* and *Naharra*, and Hübner's *Pinaris* are all nearly allied forms. One new species, *A. simulatus*, Wlsm., is described. Lord Walsingham acknowledges special indebtedness to Mr. Chambers' "Index" and descriptive work, but in his study of the species before him thinks it advisable to discard one or two of the latter's genera, such as *Harpalyce*, *Dryope*, etc., and identifies a considerable number of his species with those of Dr. Clemens and various European authors whose descriptions antedated his.

Concerning some of these eliminations, I am permitted to quote from a letter recently received from Mr. Chambers. With the prefatory remark that "Entomologists, like doctors," will differ "sometimes, and while in the main concurring in his Lordship's opinions, as expressed in the pamphlet under consideration, I feel bound to dissent from a few of his conclusions—a few only—though his more recent familiarity with the species entitles his opinion to much greater weight than mine," Mr. Chambers refers to the species as follows:—

"If my *Tinea cœmetariæella* is Clemens' *Eudarcia simulatricella*, I see no *raison de etre* for the genus *Eudarcia*. I find no greater differences between the neururation of *cœmetariæella* and other undoubted *Tinea*, than there are among the latter themselves.

"Lord Walsingham remarks that the specimen of *Depressaria applana*, Fabr., in Prof. Fernald's collection, is labelled *Gelechia Clemensella*, Cham., *salicifungiella*, Cl., but I don't think it was so labelled by me. Lord W. is mistaken in saying that it is omitted in my 'Index' (though the reference is incorrectly to vol. 9, Can. Ent., instead of to vol. 8), and I say that it appears in some respects to resemble *salicifungiella*.

"I still think my genus *Harpalyce* distinct from *Cryptolechia*, and in a letter to Lord Walsingham I have stated some of my reasons for this opinion."

Mr. Chambers is not prepared to agree with Lord Walsingham that his *Gelechia prunifoliella* is identical with his *Phætusa plutella*, nor that

G. crescentifasciella, Cham., and *G. grissefasciella* are different forms of the same species, although he does not question that the former may be equal to Walker's *G. conclusella*. Mr. Chambers further says that he "was never able to reconcile his *G. rubensella* with Clemens' *G. rubidella*," from which Lord Walsingham remarks that *he* is unable to separate it. These two (?) species belong to a group in which there is considerable variation in coloring, and in which the specific distinctions are evidently slight in the imagines, though sufficiently well marked in the larvæ, as I judge from the three or four forms that I have succeeded in rearing.

As to *Helice gleditschiæella*, Cham. (= to *pallidochrella*, Cham., according to Lord Walsingham), Mr. Chambers says: "The defect in the description of the hind wings, to which Lord Walsingham calls attention, may exist and may have been caused (as I have known similar mistakes in other cases) by a slight fold or wrinkle under the tip. I have an indistinct recollection that I observed something of this in this species. I placed this species in *Gelechia* in the 'Index' for the reason stated on page 124 of that publication, and it may be that I never gave any other description of it as a *Gelechia*. * * * * The reference in the 'Index' noted by Lord Walsingham, and occurring in various places, to Can. Ent., vol. x., p. —, was intended to apply to a paper which I thought I had sent to the Can. Ent. for publication in that volume. But I suppose it was never sent, or it was lost in the mail. * * * *

"From my bred and captured specimens of *Gracilaria superbifrontella*, Clem., oak-feeding, and *G. Packardella*, Cham., maple-feeding" (according to Lord Walsingham, identical, and equal to *G. swederella*, Thnb., whose name has precedence), "I think the species are distinct (though I have had doubts about it), and that both are distinct from *swederella* as described and figured in Nat. Hist. Tin."

In regard to *Coleophora leucochrysella*, Clem.—to which species Lord Walsingham relegates Mr. Chambers' *C. argentella* and *C. argentialbella*—Mr. Chambers says: "In a flying trip through Philadelphia, a year or two ago, I glanced at a part of the Clemens' collection, and the one thing that I recollect (for I made no notes) is that *C. leucochrysella*, Clem., is the proper name for *C. albella*, Cham. *C. argentialbella* is a different insect and smaller."

These quotations embody the most important of Mr. Chambers' differences from Lord Walsingham's opinions, and I have taken the liberty of transcribing them because I think they will be of interest to others beside

myself, and because Mr. Chambers informed me that he should not himself publish them. In all other points Mr. Chambers agrees to the value and unquestionable authority of Lord Walsingham's determinations.

In the choice of specific names, it will be observed that his Lordship does not restrict himself to the termination *ella*, as witness his *Cressoni*, *simulatus*, *inornata*, *inscripta*, etc. While it is a great convenience, to the tyro especially, to have a conventional termination for the specific names of all species constituting a certain family, such as *ella* for the Tineids, *ana* for Tortricids, and *alis* for Pyralids, there is no doubt that strict adherence to such a rule sometimes puts the author to inconvenience, and often necessitates more than a "poet's license" with grammatical rules.

In a future paper I shall have occasion to refer to a few of Lord Walsingham's new species in connection with their life histories.

ENTOMOLOGY FOR BEGINNERS.

BY THE EDITOR.

THE APPLE-TREE APHIS—*Aphis mali*? Fabr.

This species of Aphis is very common throughout the Northern United States and Canada, and has of late appeared in such numbers in some localities as to excite much alarm among fruit growers. The eggs are deposited by the parent lice in the autumn, about the base of the buds of the apple tree, and in crevices of the bark on the twigs. When first laid they are light yellow or green, but gradually become darker in color and finally black. During the winter these tiny, oval, shining black eggs may be found with the aid of a magnifying glass on almost every apple tree.

As soon as the buds begin to expand in the spring, small lice are hatched from these eggs, which locate themselves on the swelling buds and young tender leaves, and inserting their sharp beaks into the tissues, feed on the sap they contain. The lice vary in color from green to dark greenish-brown, the darker color prevailing at first, the lighter color in a few days afterwards. When they are abundant, the buds—especially the blossom buds—are sometimes thickly covered with them, yet it is seldom that any serious injury results from their attack. The growth at this

period of the year is so rapid, and the sap circulates through the branches in such abundance, that the comparatively small quantity consumed by these plant lice seems scarcely to be missed. In a few days the young leaves expand, when the insects are distributed over the foliage, and usually attract no further notice.

All the lice hatched in the spring are females, and they reach maturity in ten or twelve days, when they commence to give birth to living young, producing about two each every day for two or three weeks, after which the older ones die. The young locate about their parents and mature in

ten or twelve days, when they also become mothers as prolific as their predecessors. As the season advances some of the females acquire wings, by means of which they fly to other trees, where they found new colonies. In figure 5 both winged and wingless specimens are shown much magnified. Late in the autumn males, as well as females, are produced,

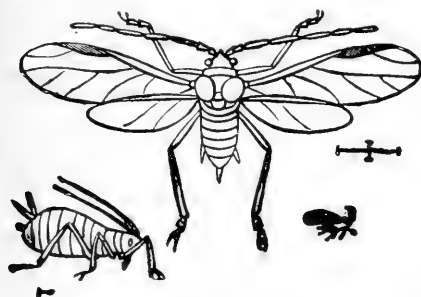


Fig. 5.

and the work of the year closes with the deposit of eggs as already described. Were it not for the activity of Lady-birds and other useful predaceous insects, which appear early upon the scene and devour multitudes of these lice, they would soon swarm on every leaf of our apple trees and become a source of serious trouble.

NOTES ON THE EARLY STAGES OF CALOPTERON RETICULATUM, FABR.

BY D. W. COQUILLETT, WOODSTOCK, ILL.

On the 10th of July I found a pupa of this species suspended by the hind end of its body beneath a log. The larval skin was rent and worked backward, but still retained nearly its original shape and color, and by comparing it with certain larvæ which I have frequently met with in similar situations, there is no doubt in my mind but that these latter belong to the above species.

These larvæ very closely resemble that figured by Packard on page 465 of his "Guide" (fig. 432), which in the text on the succeeding page is referred to *Photuris*. The dried specimens now before me measure

about 12 mm., and are of a dull purplish-brown color; venter pale yellow, tinged with pink and marked with a brownish stripe on each outer edge, and with two rows of brown spots, these not extending upon the first three segments; head retractile, dull blackish, the region of the jaws polished brown, and furnished with four black prickles, the upper two of which are placed transversely, the lower two longitudinally.

The pupa mentioned above tapered quite regularly from the head to the tail, and was of a blackish color, shaded in places with whitish; segment one flattened above, and on each outer edge, near the anterior end of the segment, are two white, fleshy horns, the posterior ones the longest; on each posterior angle of this segment is a long, white horn, curved backward; on the anterior part of each abdominal segment is a sharp transverse ridge, which unites at right angles with a subdorsal ridge that extends lengthwise across the segment; near the places where these ridges meet is a low whitish tubercle; a stigmatal row of whitish horns, two to each segment, curved forward, those on the first abdominal segment the longest, those on each succeeding segment shorter than those on the segment preceding it; antennæ-cases curved, longer than the leg-cases, white, marked with black; length, 13 mm.

The beetle issued from the above pupa on the 21st of July, and was of the variety *terminale* of Say.

THYRIDOPTERYX EPHEMERCEFORMIS, HAWORTH.

BY FREDERICK CLARKSON, NEW YORK CITY.

By the kindness of Mr. Donnelly, the very efficient head gardener of the Central Park, of this city, I am put in possession of sixty cocoons of the "Basket-worm." They were taken from the terminal twigs of a sapling Sycamore Maple and Horse Chestnut growing on the low land in the immediate vicinity of the zoological garden. The cocoons hung in clusters on every twig, and as they had excited considerable curiosity, the gardener permitted them to remain until about the period of egg-hatching. I have supposed it might be of interest to the subscribers of the CANADIAN ENTOMOLOGIST to have the result of my examination of these cocoons. Ten of them had been occupied by the male, as attested by the puparium within. In about an equal number I found the broken shell-case of the female, all else having been devoured by parasites, some of which, in pupa condition, were found within the cocoons. The remainder of the cocoons

contained the long larva-like puparium of the female, fastened at either end with stout silken bands to the side of the cocoon. The thoracic portion of the puparium, upon being slightly pressed, separated in atoms, and the downy substance with which it had been filled floated away in the air like dust: the abdominal portion of the puparium contained from fifty to eighty soft yellowish eggs. It has been thought by some of our Entomologists that the eggs are deposited among the silken threads in the upper part of the cocoon, and by others that they are not extruded from the body of the parent, but that the moth dies retaining them. Later investigation, however, has shown that they are deposited within the puparium, a fact clearly demonstrated by the observations that I have made. The very unusual method as displayed by this moth for the protection of its ova, is probably attributable to the fact that the shells are singularly tender, and as the slightest touch would make a jelly of the whole deposit, this extraordinary provision is made necessary.

CORRESPONDENCE.

LAST YEAR'S COLLECTING.

The connection between the weather and insect life is an interesting subject, but one that requires a vast amount of observation before any conclusions of much value can be reached. We are all familiar with the relation of the weather to the crops, but insects seem more dependent on favorable weather than vegetation is. The first part of a season may be very injurious to vegetation, whilst later on a favorable change may occur and it will recover all it lost and even exceed an average; but with insects, if they have been seriously interfered with in the early part of their career the result is generally fatal to the bulk of them for that season. This is undoubtedly one of nature's methods for preventing excess. Ontario alone has a varied range of climate, and what is said of one section will not apply to others. Vennor considers Hamilton and neighborhood endowed with a climate peculiarly its own, and the verdict of concurrent opinion is favorable. But whether it was the open winter or the long continued cold of spring, certain it is the summer of 1882 was rendered remarkable by the absence of Diurnals: even those least observant remarked it. *Pieris rapæ* appeared early, and then disappeared almost entirely until quite late in the season. I did not see half-a-dozen *Archippus* the whole summer. The milk weeds stood in

unbroken leaf until late in the fall, when they were taken possession of by extensive broods of *Euchates egle* larvæ. Even Skippers were scarce, and it was quite a treat to see a *Philodice*. On the 23rd of June I took for the first time here a *Terias lisa*, and there was not another yellow butterfly to be seen in the field. If *Philodice* had been plentiful I might not have noticed it. The Noctuids generally were scarce, and there was a noticeable absence of cut worms in both field and garden. There were but few species of *Catocala* abroad, and these not plentiful, except *Habilis*, which was so abundant as to be offensive. To our delight the highly attractive *Relicta* appeared in goodly numbers, which it was never known to do here before, and three dozen of them were secured. In fall moths a few good things were taken, but not in any quantity. In beetles, *Carabidæ* were scarce; wood borers were moderately plenty, but they were very late and straggling in appearing. Taking the season all through, it was not one of much success for collectors.

J. ALSTON MOFFAT.

GREAT ABUNDANCE OF PAPILIO (THOAS) CRESPHONTES.

This large species of Swallow-tail swarmed here last summer. My friend, Mr. Gilbert, Mr. Allis, and myself, took about 300 larvae. There are two broods. Its chosen food here seems to be the prickly ash. The young larvæ have the slimy, slug-like appearance characteristic of young *troilus*; indeed the two species resemble each other somewhat before the first moult. Why this fine species, which in times past has been very rare, should appear in such large numbers, is one of the events in the life of insects not well understood.

LARVA OF CATOCALA MESKEI.

Color light drab or cream. Head bi-lobed, ringed in front by a narrow, dark brown line; extremity divaricate. Between the fifth and sixth segments is a light brown band. An elevated band of obscure brown occurs on the seventh segment. Under side blackish brown. Length $2\frac{1}{2}$ inches.

This larva is much more uniform in color than any other *Catocala* larva I have met with. Its chosen food is the poplar, and I may add by way of a hint to those who are desirous of getting *C. relictæ*, that the poplar is the favorite food of this dainty moth. Last season four perfect specimens were taken, all on the poplar; one male was very dark and beautiful. This season five were taken from the same source, among them a dark female.

ROBERT BUNKER.

The Canadian Entomologist.

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No. 6

DESCRIPTIONS OF A FEW ELATERID AND ALLIED LARVÆ.

BY D. W. COQUILLETT, WOODSTOCK, ILL.

The following larvæ have the usual elongate, sub-cylindrical form and hard integument of the notorious *wire-worm*; they all live in decayed wood, and pupate in cells in the wood.

For the determination of the perfect insects I am indebted to Mr. E. P. Austin.

ELATER NIGRICOLLIS, Herbst.—Body polished, yellowish brown, palest underneath and at the sutures of the segments; a narrow dark brown band at either end of each segment except the first and posterior end of the last segment; these bands pass entirely around the body; the last segment tapers posteriorly to a fine, dark brown point; head dark brown, the jaws black; a prop-leg beneath segment 12; length about one inch. I found several April 25, and enclosed them in my breeding cage, in which was placed some decayed oak-wood and damp sand; the first pupa was noticed August 19, and the beetle issued from it on the 30th of the same month.

ANDROCHIRUS FUSCIPES, Mels.—Body polished white; a brownish band on the posterior end of each segment, and also one on the anterior part of segment one; these bands pass entirely around the body; the last segment tapers slightly posteriorly, rounded at the end, and usually tinged with brown; ventral part of first three segments pale brownish; head brownish above, whitish beneath; no prop-leg beneath segment 12; length about one inch. Several larvæ were collected April 25, and one beetle issued from these on the 29th of May following. As the larvæ which remained in August were all of one size, I concluded that this species requires two years to complete its transformations.

ATHOUS CUCULLATUS, Say.—Body brownish black, the sutures whitish; venter from a little above the spiracles whitish, marked with five rows of brownish spots, those in the outer rows elongate, forming a broken line; those in the next row smaller and placed behind the middle of the segment;

those in the middle row much larger than the others, taper slightly posteriorly and do not extend upon the first three segments; last segment flattened above, with three small tubercles on each outer edge, the hind angles are produced into a two-pronged projection, the inner prongs of which are bent inward, nearly meeting; head dark brown; a prop-leg beneath the last segment; length nearly one inch. I found several of these in some decayed oak-wood April 5, and the beetles which issued from them were first observed July 8. One of these larvæ devoured a Capricorn larva, which I put in the same collecting box. I have also found these larvæ in decayed apple-wood.

CENTRONOPUS CALCARATUS, Fabr.—Body polished light brown; last segment terminates in two, short, thick points; head light brown; no prop-leg beneath the last segment; length slightly over one inch. From larvæ found in early spring, one pupa was observed May 21, and the perfect beetle issued from this on the 29th of the same month.

ON THE NORTH AMERICAN CALPINÆ TO HELIOTHINÆ.

BY A. R. GROTE.

(Concluded from page 77.)

NEUMOEGENIA Gr. (1882).

Form slender; vestiture scaly; clypeus rough, with a superior arched ridge, infra-clypeal plate prominent; wings very wide, entire; apex determinate; external margin regularly rounded. Labial palpi short. Legs slender and apparently unarmed. Eyes naked, unlashd. Abdomen hardly exceeding secondaries. Body untufted on the dorsal line. The type and only species is snow white, with a large, golden, metallic, trigonate, median patch on primaries above, leaving the external margin and costal white, and with a white patch at extremity of median vein and a reddish stain near the base of the wing.

1. *Poetica* Gr. Arizona.

This is one of the prettiest moths allied to *Plusia* in our fauna.

This paper is the result of my studies upon Mr. Neumoegen's collection, commenced last autumn, but interrupted and delayed by my bad health. The first part, already published, was put into shape from my

notes, before I saw a paper of Mr. Smith's on the *Heliothine*, in which the characters used being those previously employed by myself in separating the genera, similar results could not fail to be reached. I had in fact corrected my arrangement in the New Check List, on examining for the first time *Tamila Nandina*. I found, as pointed out by Mr. Smith, that this insect, the type of *Tamila*, is a *Lygranthoccia* (= *Schinia* Smith). I had then to arrange my species of *Tamila* differently, and also create a new genus for *Lucens*. Already in the Check List I had taken *Lucens* out of *Heliothis*, and I associated it with *Meadii* and *Tumida* in Mr. Neumoegen's collection under a new genus. So far I had gone independent of Mr. Smith. Mr. Smith's paper is an excellent one, and goes much farther than I was able to extend my study. He originally shows that we have two European genera, *Sympistis* and *Helioata*, in our fauna, and he unites several species, partly unexamined by me, with the genus he calls *Schinia*, but the majority of the species of which I had arranged under *Lygranthoccia* in 1875; and I had, while describing the type, given in my "List" a wide value to the genus. In some single cases I thought the tibial armature would give generic characters, and for that reason among others retained some of my own and Guenee's genera as distinct from *Lygranthoccia*.

I shall, therefore, bring this paper to a conclusion by pointing out the characters of certain genera. The arrangement of the *Heliothine* which I make differs from Mr. Smith's by my commencing with *Anarta*, *Sympistis*, *Melicipletria*, *Heliothis*, etc., and concluding with *Lygranthoccia* as in my New Check List, bringing the genera with bulging clypeus and often white colors before *Tarache*, which may be called the typical genus of the succeeding group. Although I have used natural characters to support my genera, I think comparative characters and the subordinate ones of color and marking should have some weight. As much as possible we should avoid associating species violently dissimilar in general look, on account of their agreement in armature or the structure of the eyes.

As stated in the first part of this paper, the group I have called *Stiriine* presents some resemblances to the *Heliothine* by reason of the often armed tibiae. It is more nearly related to the *Plusiine* by the shape of the wing and the often metallic colors. It has characters which are peculiar, the short thorax and the patagia deflected at the tips. The bulging clypeus allies some of the genera to *Lygranthoccia*. I would distinguish *Basilodes* by the conical third palpal joint, while I have explained

the characters of the principal genera in the first part of this paper, so far as I have material before me to examine. The present paper is intended to supply material for the future monographist of the *Noctuidæ*, with my other studies already published, and I need not weigh critically the value of certain points of structure at the present time. A recent paper of mine in "Papilio," upon classification, gives briefly the general conclusions to which my experience has led me. I wish only here to show that a study of natural characters leads to a correspondence between the results of different observers which is not attained in any other way. Important discrepancies may be laid to a failure to study enough material or to examine it thoroughly. By the system of Gueneé the limitation of the genera was made more uncertain; by that of Lederer the confines were more clearly exposed. But no finality can be reached until, all the *Noctuidæ* being known, a final arrangement will be arrived at from the mere futility and unimportance of changes dependent to a considerable extent on the mere temper of the writer. Just as *Thalpochares* obtains as against *Trothisa*, so I should retain *Lygranthoeccia* as against *Schinia* or my term *Euleucyptera*. It is clearly of less importance what name we give the genus when its limits are agreed upon generally speaking. Even after the minute researches of Lederer and Von Heineman, some species are difficult to place and will oscillate for some time. Many differ in comparative characters only, and about the value of these there will not be easily found an agreement between writers. Gueneé's genera in both *Noctuidæ* and *Geometridæ* are not based on scientific or natural characters, but he arrives at results sometimes identical with those of Lederer. Lederer is decided in his criticism of Gueneé, but not personally hostile or illiberal, hence his remarks have a certain value which they would not otherwise bear. Now quite recently in a monograph which is certainly exhaustive in appearance and the result of a wonderful industry, Dr. Packard very strongly endorses Gueneé and considers his work as superior in value to Lederer's by distinct implication. I myself do not share this opinion, and since my return from Europe in 1867, I have used the natural characters laid down by Lederer and discarded the comparative ones of Gueneé. In fact I could not understand genera comprising "groups" entirely arbitrarily composed, without definition, embracing species with hairy and naked eyes (e. g. *Aplecta*) or with no reference to the structure of the feet. The exceptions to his diagnoses are often more numerous than the typical forms. "Souvent," etc., is a term which seems

to acquire an absolute character with Gueneé. But his descriptions are very good, and he tells you very little in a very entertaining and lengthy way. Lederer is very exact and thoroughly grasps the subject of structure,—perhaps a little too strict in his definitions, but of a far more genuine temper which is everywhere scientific. This brief resumé of the qualities of the two writers who have attained celebrity in Europe; and who are now no longer with us in the flesh, suggested to me the idea that we should be more conservative and less violent in the expression of our opinions. Each new writer seems to offer himself as the measure of that part of creation which he dabbles in, and lays down the law with an absolute assertion which I know from my own experience will be modified as he comes to know more, if he is ever, indeed, to know much. I do not intend either to speak unkindly, or to arrogate to myself the right to speak at all. I almost feel that I am laid under an obligation in being permitted to express my opinions, although I have been writing these twenty-two, and studying for now more than the twenty-five years which have passed away. I hope after I am silent that it will be remembered that I fought against my naturally positive opinions as much as I could. In my first paper I know I expressed myself with diffidence and the likelihood I should make mistakes. It was pretty dark in those days. The Synopsis of Dr. Morris was not published, and I could not get a name for a moth in the length and breadth of the land, except for the few species discussed by Dr. Harris in his *Insects Injurious to Vegetation*. Those half a dozen Noctuids have now grown to nearly 1,700 names, about four fifths of which most of us know all about, or fancy we do. It must be admitted that much of my work was necessarily very difficult, and early mistakes more readily excusable than they are to-day.

LYGRANTHOECIA G. & R.

Type: *Crambus Marginatus* Haw.

Eyes naked, unlashd, full. Front moderately bulging, shortly scaled. Infra-clypeal plate not exposed. Fore tibiae heavily armed; middle and hind tibiae spinose. Vestiture of mingled scales and hair. The armature of the shortened fore tibiae consists in two long, sub-equal claws, which slightly overlap on the inside, and a series of four, diminishing in size on the outside of the joint. Mr. Smith's figure (3) does not agree with my specimens, in which the outer series is equidistant and the final claw proportionately shorter; they are distributed further along the joint, which

is differently shaped from the figure, the last claw of the outer series being placed much further towards its upper end. The drawing of these parts is a matter of much nicety, and while Mr. Smith may be complimented upon his plate, I am not able to recognise the figure of this species. It is certain that the claws do break off, or are not developed, for in one specimen the outer series is plainly reduced to three.

This generic term might be retained for the following reasons: I use it in 1874-5 in the sense of *Anthoecia* Guen., which cannot be kept, the type, *Cardui*, being also the type of *Melicleptria*. In my list I include 18 species, *Celeris* erroneously, as I show this to be a *Melicleptria*. I retained the genera *Tamila*, *Euleucyptera*, *Schinia*, *Oria*, based on but few species, as distinct. I did this for the reason that I was under the impression that the modifications of the armature of the fore tibiae would give generic characters when all the species were compared, which I never pretended to do, or had the means of doing until very recently. I was also interested in keeping the generic synonymy plain, so that the types might be understood, and, unless I have come to a positive conclusion, I have preferred to keep the old genera alive until the family is monographed. The term "*Schinia*" is "resurrected" by me out of the *Verzeichniss*, where it is used for the three species, *gracilentia*, *trifascia*, *bifascia*; the other species, *tuberculum*, is referred by Hubner to another genus. No other author uses this term before me, and I consider *Trifascia* as typical. *Tamila* is used by Gueneé for a single species, *Nundina*, respecting which I have been in error until last fall, when I examined it carefully for the first time, and found it to be a *Lygranthoecia*. Illness prevented my continuing and finishing my paper (which is now completed with this instalment) until after the appearance of Mr. Smith's paper, in which this fact is first publicly established. Mr. Smith interestingly shows that *Euleucyptera* does not sufficiently differ, so that this genus with its single species must also be retired. As to *Porrima*, I had associated *sanguinea* and *regia*, but now accept the conclusion that the modifications of armature they show are not generic. In my New Check List I kept *Anthoecia* temporarily for the yellow-winged forms, of which *Anthoecia juguarina* Guen. may be considered typical, the number of species of the *marginata* type having grown; it is manifestly only a "color genus," and, as I had previously shown that Gueneé's term was inapplicable, my action was injudicious. I am not satisfied, however, that all of Mr. Smith's *Schinia* belong to *Lygranthoecia*. Except my *Tricopsis chrysellus*, I

assume that they do for the present, in order to complete the matter. My *Tamila tertia* I am sure will come to be separated, and my *Heliothis cupes*. The case of this genus is analogous to that of *Thalpochara*, in which the name is preferred under which the most of the species were placed together, although Hubner had genera which were older for certain single species. Mr. Smith uses *Lygranthoea* evidently in this sense in the "Synopsis." The species of *Lygranthoea* are:—

1. *Rivulosa* Guen. Can. southward.
Marginatus Haw.
2. *Thoreaui* Gr. & R. Middle and South.
3. *Constricta* Hy. Edw. Georgia.
4. *Saturata* Gr. Southern States to Mass.
Rubiginosa Str.
5. *Separata* Gr. West; the vars. are geographical.
Var. *Acutilinea* Gr.
Var. *Walsinghamii* Hy. Edw.
Var. ? *Coercita* Gr.
Var. *Balba* Gr.
6. *Parmeliana* Hy. Edw. West.
7. *Regia* Streck. Texas.
8. *Sanguinea* Geyer. West and South.
9. *Nundina* Drury. West and South.
10. *Bifascia* Hubn. South.
11. *Trifascia* Hubn. East to South.
12. *Gracilentia* Hubn. South.
Oleagina Morr.
13. *Obliqua* Sm.
14. *Velaris* Gr. West.
15. *Tertia* Gr. Texas.
16. *Albofascia* Sm. Texas.
17. *Roseitincta* Harvey. Texas.
18. *Bina* Guen. Georgia.
19. *Tuberculum* Hubn. Georgia.
20. *Siren* Streck. Texas.
21. *Lynx* Guen. South and Middle.
22. *Brevis* Gr. South and West.
Var. *Atrites* Gr.

23. Meskeana Gr. Tex., Fla.
Var. Rufimedia Gr.
Fastidiosa Str.
24. Scissa Gr.
25. Limbalis Gr.
26. Arcifera Guen. New York.
♀ Var. Arcigera Guen.
♂ ♀ *forma typ.* Spraguei Gr.
27. Spinosae Guen. Eastern States.
28. Packardii Gr. Colorado.
29. Mortua Gr. Colorado.
30. Nubila Streck. Texas.
31. Nobilis Gr. Colorado.
32. Errans Sm.
33. Jaguarina Guen. Colorado.
34. Inclara Streck. Texas.
35. Cupes Gr. Texas ; Calif.
36. Lupatus Gr. Texas.
37. Gloriosa Streck. Texas.
38. Lanul Streck.
§ *Eulucyptera* Gr.
39. Cumatilis Gr. Colorado.
Sulmala Streck.
40. Tenuescens Gr.

TRICOPIS Gr.

Type : T. Chrysellus Gr.

The infra-clypeal plate is prominent. The armature of the fore tibiae approaches that of *Trifascia*; I have described it Bull. Buff. Soc. N. Sci., in my table of a part of the Heliothid genera, which, now ten years old, is all I have published towards a close examination of the Heliothid genera. The species are silvery white and easily recognized: the honey brown thorax and bands on the primaries agreeably contrast. The genus is not very distinct from *Lygranthoeccia*, but I will not draw it in from the structure of the front. Other characters are given in some notes of mine, which at the moment I cannot verify. Our species apparently are three :—

1. Chrysellus Gr. Texas.
2. Hulstia Tepper. Texas.
3. Aleucis Harvey. Texas.

TRIOCNEMIS Gr.

Type: T. Saporis Gr.

The essential characters are originally given by me in the posterior thoracic tuft and the tridentate anterior tibiae. Our species resembles the European *Calophasia* in appearance. It is a remarkably handsome insect.

1. Saporis Gr. Arizona.

RHODOSEA Gr.

Type: R. Julia Gr.

This genus contains our handsomest of the pink species, and is allied to *Rhodophora Florida*. It differs strongly by the two-clawed anterior tibiae, the unarmed tibiae, the structure of the front and the narrow wings. The lovely species has the fore wings of a delicate pink, with a pale yellow dash on the cell, the edges and fringe pale yellowish. Fore tibiae abbreviate, with a shorter outer and longer inner terminal claw. Front very bulging, with the infra-clypeal plate centrally exposed. Eyes full, naked, unlashd. Tibiae not spinose. Labial palpi relatively short; tongue moderate. Vestiture hairy. In the shape of the wings there is a resemblance to *Heliophila*. The feet, face and thorax in front are flushed with pink. The species was collected by Prof. Snow, and is probably flower-haunting, as is *Florida*. I named it for my little daughter, who takes an intelligent interest in natural objects, and who came to me when her mother was taken away, now more than ten years ago.

1. Julia Gr. New Mexico.

ANARTA Ochs.

I have referred to this genus three species, *Promulsa*, *Nivaria* and *Submarina*, which differ from *Mamestra* and *Dianthoecia* by the untufted abdomen and hairy and longer vestiture. The hairy eyes are full, but the general form is more like *Anarta*; the habitat of the first two is that of elevated regions in the Rocky Mountains or Colorado. I have examined the types of *Orthosia perpuræ* and *Mamestra curta* of Mr. Morrison. The eyes appeared hairy (under a pocket lens) and the species the same. In my own mind no doubt exists that they are both referable to my *Anarta nivaria*. This could not be inferred from the way in which they were described. The specimens are too poor to be perhaps certain that they belong to *Nivaria*. I cannot regard *Promulsa* as a *Dianthoecia*, and Mr. Morrison himself says: "We refer this interesting species to

Mamestra provisionally," and again, "we think that it will probably become the type of a new genus" (Ann. N. Y. Lyc. 97).

To conclude, the genera as arranged in my "New Check List," must be modified so far as the *Heliothinae* are concerned, from Mr. Smith's observations, but I would refer the student to my paper in Am. Ent. Soc. for what seems to me the most natural arrangement of the genera. The genera of the *Stiriinae*, here fully discussed, may be placed between the *Calpine* and *Plusiinae*, but their arrangement is somewhat optional so far as our present knowledge extends. They have the body shortly scaled, the thorax short, collar and tegulae deflected or not closely applied, the abdomen weak, untufted, the shape clumsy. The object of the present paper is attained in showing that the *Stiriinae* have certain structural features taken from the already indicated sub-family groups with which they have hitherto been associated, but united in a different way, and are thus equally entitled to recognition as a sub-family of Noctuidæ.

NEW TABANIDÆ.

BY JOHN MARTEN, CARBONDALE, ILL.

TABANUS ALLYNII. Length 15 mm.

Female.—Eyes naked, no ocelligerous tubercle. Front yellowish-gray; callosity chestnut, nearly square, with an unconnected, spindle-shaped line above. Face and cheeks yellowish-gray. Antennæ reddish-yellow, annulate portion black. Palpi yellowish with white hairs. Thorax and scutellum grayish-black with minute golden-yellow pubescence; humerus reddish-brown when denuded; pleuræ and pectus grayish with white or yellow hairs. Abdomen yellow, segments 4-7 black with yellow hind margins, which are expanded into triangles on the middle of segments 4 and 5; first segment black under the scutellum; second segment with a black triangle on the middle, and the third segment with a dark spot on each side of the middle. Venter yellow with a black line through the middle and tip dark. Legs—femora black, yellow at the tips; tibiae yellow, darker at the tips; outer half of front tibia black; tarsi brownish, front ones black. Wings hyaline; stigma yellowish.

Male.—Differs principally in having the colors brighter; the abdomen

has less black, but there are two rows of black spots on all but the last segment, and is slightly darker on the lateral margins. Tibiæ darker.

From North Carolina.

THERIOPECTES TETRICUS.—Length 17 mm.

Female.—Eyes pubescent, ocelligerous tubercle present. Front black; callosity black, shining, with an unconnected black spot above; sub-callous black, denuded. Face and cheeks black with white hairs. Antennae red, third joint black, upper angle projecting but little. Palpi white with white hairs. Thorax grayish-black with the usual gray lines and gray pubescence; humerus reddish-brown; pleurae and pectus gray with long white hairs. Abdomen black, with three rows of white triangles, the middle row indistinct; the sides of segments two and three reddish; hind margins with a fringe of white hairs, which is wanting between the middle and outer triangles. Venter yellowish-red with gray pollen, darker towards the tip. Femora black, yellowish-brown at the tips; tibiae brown, darker on the distal half; tarsi black. Wings hyaline.

From Montana.

THERIOPECTES FRENCHII.—Length 14 mm.

Female.—Front black; callous dark brown with a line extending above; sub-callous black. Face and cheeks black with white hairs; palpi yellowish with minute black hairs. Antennae red, annulate portion of third joint black, angle not prominent. Thorax black with the usual lines; humerus reddish-brown; pleurae and pectus with white hairs. Abdomen black with three rows of triangles, the lateral rows from segments one to four prominent, middle row largest on second segment, on the other segments only an expansion of the hind margins; lateral margins of segments 4-7 yellow with white hairs. Venter reddish-yellow, darker towards the tip, covered with gray pollen. Femurs black, with whitish hairs, brown at the tips; tibiae brown, with white hairs, darker at the tips; tarsi black. Wings hyaline with faint clouds on the cross veins and bifurcation of third vein.

From Montana.

THERIOPECTES SUSURRUS.—Length 14 mm.

Female.—Front gray; callosity brownish-black with black line above; ocelligerous tubercle brown. Face and cheeks white with white hairs; palpi yellow with minute white hairs, and a few black hairs. Antennae

red, distal half of third joint black, angle prominent. Thorax black with four gray lines; humerus reddish-brown; pleurae and pectus gray with white hairs. Abdomen black with two rows of triangles on segments one to five, a faint dorsal brownish stripe and a little expansion of the white hind margins on four and five. Venter brownish-yellow. Femurs black with white hairs, brown at the tips; tibiae brown, darker towards the tips; tarsi black. Wings hyaline, faint clouds on the bifurcation of third vein and middle cross vein.

From Montana.

ON THE EARLY STAGES OF THE DIPTEROUS FLY, *CHRYSOPILA FOLDA*, LOEW.

BY D. W. COQUILLET, WOODSTOCK, ILL.

LARVA.—Body polished, yellowish white, nearly cylindrical, anterior part tapers to the head; eleven visible segments; footless; posterior end of last segment deeply notched horizontally and less deeply so vertically; on each side a small notch above sinus of horizontal notch; on under side of each of the two lobes, formed by the horizontal and vertical notches, is an elliptical, reddish-brown raised spot; on under side of last segment, near the anterior end, is a somewhat conical impressed spot, the base of the cone being at the anterior end of the segment; in the middle of this cone is a longitudinal impressed line; length from 20 to 25 mm.

PUPA.—Cylindrical, of about the same width throughout; dark brown; on each of the six segments, anterior to the last one, is a transverse ridge, armed with minute points; last segment somewhat truncated behind, and armed with a few small points, two of which are placed side by side on the ventral side, and these points diverge from each other; on the front of the head are four very small warts, and at the junction of the head and thorax is a transverse row of six small warts, the second from each end being larger than any of the others; spiracles in the form of rough warts, one pair to each of the last eight segments, except the last one; leg-cases reach to the anterior third of the seventh segment, counting from the hind end of the body; wing-cases reach to the anterior end of the above segment; length about 16 mm.

The larvæ from which the above description was drawn were found

May 4 in a plot of ground where onions had been grown the preceding season. I placed several of them in one of my breeding cages, and by the 10th day of May all but one had pupated. The first flies issued May 22. One pupa worked itself about half way out of the dirt in the morning, and while in this position the fly issued during the day.

The first pupæ found out of doors were taken May 9, and the earliest date of capturing the flies was May 21; three days later several pairs were observed united *in coitu*.

For the determination of the above species, I am indebted to Dr. Hagen, who writes me that he has compared my specimens with Loew's types.

NOTES ON THE EARLY STAGES OF *LIXUS MACER*, LeCONTE.

BY D. W. COQUILLET.

On the 13th of July, 1881, I saw a female *L. macer* busily engaged in gnawing holes in the stem of a green *Helianthus grosse-serratus* (Wild Sunflower). There were several holes in the stem of this plant, and in each I found one or two eggs, of an elliptic-ovoid form, polished pale yellow, and measuring about two and one-fourth mm. in length. In the stems of other similar weeds, which grew near to this one, I found several recently hatched larvæ. I examined the stems of this same kind of weed at intervals throughout the summer season, and found the larvæ in different stages of their growth, sometimes two or three in the same plant. Late in October I noticed that many of these weeds had been broken off, and the pieces—from one and a half to three feet in length—were lying about upon the ground. These pieces contained a larva—evidently of the above species—and at one end, and occasionally at each end, the pith and woody part had been gnawed away, leaving nothing but the bark, and this had evidently been broken off by the wind. I examined a few of these pieces on the 25th of the following April, and found nothing but larvæ; another examination was made on the 12th of the following month, when nothing but larvæ were found, but all were dead.

From these observations it would seem that the eggs are deposited about mid-summer, the larvæ hatch out in a few days, reach their full growth in three or four months, and hibernate in their burrows as detailed above, assume the pupa form early in the following summer, and are changed to beetles shortly afterward, thus completing their transformations inside of a year.

CIRCULAR OF INQUIRY CONCERNING CANKER-WORMS.

The U.S. Dept. of Agr. in November last issued the following circular:

In preparing a bulletin upon the subject of Canker-worms, to be issued from this Department, I find that much of our present information is of little service, for the reason that until the year 1873 two entirely distinct species of Canker-worms were confounded in description, seasons, habits, and geographical distribution. In many of the publications, of late date even, the distinction is made either not at all or insufficiently.

The most widespread and best known species is the Spring Canker-worm (*Paleacrita vernata*, Peck). The female rises from the ground chiefly in spring, and secretes her ovoid and delicate eggs. The second species is *Anisopteryx pomotaria*, Harris, and the female rises chiefly in the fall, and lays her eggs in serried and exposed masses.

Will you please give such information as you possess, especially upon the following points, in regard to the occurrence of Canker-worms in your own locality:

1. Which species, if either, is now found in your own locality, or has ever been found?
2. When was it first observed there?
3. During what years has it been especially injurious?
4. During what years has it been entirely unnoticed?
5. Has the appearance of the perfect or parent insect been confined to either season, the fall or the spring, or has it covered both?

Wherever any doubt can or does arise in regard to the species observed, it is particularly requested that specimens may be sent to the Department. All expenses for packing and postage will be reimbursed to the contributors if a request to that effect is made; or boxes and stamps for the return of specimens will be sent to any who will notify the Department of intention to contribute information and specimens.

Observations may be made during all mild weather from the present month (November) until the middle of June. The more frequent and detailed the observations the greater will be their value. If you have not the time or inclination to make these observations personally, you will confer a favor by handing this circular to some person who will be interested.

Should this circular come to the hands of any entomologist familiar with

the two species, I would respectfully ask of such any information they may possess that will throw light on the range and preferred food-plants of either.

Respectfully,

C. V. RILEY, *Entomologist*.

BOOK NOTICES.

Catalogue of British Coleoptera, by Rev. W. W. Fowler, M.A., and Rev. A. Matthews, M. A., London ; West, Newman & Co.

This Catalogue differs in some respects from all preceding lists of British Coleoptera. It is, namely, a partial adaptation of the American views by completely separating the Rhynchophora and Heteromera from the remaining series of the order, and the placing of them after the other series. The changes suggested in the relations of the families of normal Coleoptera, in the system of Drs. Horn and LeConte, are not yet in full favor with the conservative students of Great Britain, but may in future win approval as they become better known.

The American system, as it may be briefly termed, is fully set forth in the revised "Classification of the Coleoptera of North America," just published by the Smithsonian Institution. A notice of this work appears below.

The innovations of the system consist in a re-arrangement of the bulk of the families into four sets: Adephaga, with the most perfected exoskeleton and powers of locomotion; Lamellicornia, with the greatest visceral and nervous concentration, and highest development of sense organs; pseudo-tetramera; the remainder constitutes a vast complex of Clavicorn and Serricorn families, which may be divided into several ill-defined sub-series.

Classification of the Coleoptera of North America; by John L. LeConte and George H. Horn.

Prepared for the Smithsonian Institution, Washington, 1883. Crown, 8vo., 605 pages.

The Entomologists of America are placed under renewed and deep obligations to Drs. LeConte and Horn for this new edition of the classi-

fication of the Coleoptera. More than twenty years have passed since the last edition was issued, and during that time no branch of natural science has made more substantial and rapid progress than this department of Entomology. The number of zealous workers in the field has greatly increased, and the accumulated stores of collectors have been subjected to close examination and critical study, chiefly by the distinguished authors of this work, and the results have added to our list of genera and largely to our list of species, which now includes more than 11,000 in all.

In the introduction the external organization of the Coleoptera is fully treated of, aided by illustrations and followed by a useful series of tables of the various orders. The whole of the classification has been revised and brought into harmony with the present advanced condition of knowledge on this subject. The work is very complete and bears evidence of the vast amount of labor and erudition bestowed on it. Collectors everywhere will find it a most valuable guide in their studies and in the arrangement of their collections.

The Pine Moth of Nantucket, *Retinia frustrana*; by Samuel H. Scudder. Crown 8vo., 24 pages, with one colored plate. Published by the Massachusetts Society for the Promotion of Agriculture, 1883.

We tender the author our sincere thanks for this excellent paper, containing the life history of this new enemy to pine trees, to which is appended a brief account of other native species of *Retinia*. The pamphlet is well gotten up, and the colored plate a chromo-lithograph beautifully executed. It represents the insect in its various stages along with the tips of the injured branches.

Report of the Commissioner of Agriculture, of Washington, for 1881 and 1882; 8vo.

We have been favored with a copy of the full report by the Commissioner, and have also received separate reports from the Entomologists, Prof. C. V. Riley and Prof. J. H. Comstock. The full report forms a large octavo volume of 703 pages, and is illustrated with a number of plates and diagrams. The report of the Botanist on grasses suitable for Texas, has 25 plates; that of the Veterinary division on Swine Plague, Fowl Cholera, and Southern Cattle Fever, 12 plates. The report of the Chemist contains the results of an extended series of experiments on varieties of

sorghum and maize, with results of the analysis of the constituents of these plants at different periods of their growth, particularly in reference to the available sugar contained in them. This valuable section of the work is illustrated by 21 plates, and contains also much other useful matter in reference to analysis of soils, fertilizers, etc. There is also a report from the Superintendent of Grounds, in which he gives the good results of mulching the ground with refuse tobacco stems, as a remedy for thrips on foreign grape vines grown under glass, and submits notes on a number of tropical and sub-tropical plants, some of which might probably be cultivated with success in Southern California or Southern Florida.

That part of the report devoted to Entomology is extremely interesting, and contains much that is valuable; it occupies 154 pages and is illustrated by 20 plates. The chief subjects treated of in Prof. Riley's portion are Silk-culture in the United States; Pyrethrum—its history and cultivation; the Army Worm, Scale Insects of the Orange, including the results of experiments with emulsion of kerosene oil for their destruction; Insects affecting the Rice Plant; Corn Insects, the Cotton Worm, Clover Insects. In that part contributed by Prof. Comstock we find a very complete history of the Apple Maggot; also of some allied species of *Drosophila*; a chapter on Lady-birds, and another on Lac Insects, all illustrated by excellent plates drawn by Mrs. Comstock. Some valuable information is also given on methods for destroying Scale Insects with alkaline solutions.

Insects Injurious to Fruits; by William Saunders. Philadelphia: Lippincott & Co., 1 vol., 8vo., pp. 436.

It is with very great pleasure that we announce to our readers the publication of Mr. Saunders' admirable work on the Insects Injurious to the Fruits of North America,—as the volume includes those affecting the orange, the olive and the fig, we think that we may fairly apply this extended title to it. As the readers of the CANADIAN ENTOMOLOGIST are aware, there is no one in Canada, and very few indeed in the whole of America, so competent as our esteemed Editor to produce a work of this character. It is needless for us, then, to say more in praise of the work than that it is the crowning achievement of one who has devoted a large portion of his time and labor during the last twenty years to the practical study of insects, and whose intimate acquaintance with fruit culture in all

its aspects is only surpassed by his complete knowledge of the insects, both injurious and beneficial, that affect the labors of the horticulturist. The book is written clearly and concisely throughout in our author's well-known terse and vigorous style, and is so free from scientific and technical terms that any fruit-grower, no matter how ignorant of Entomology, can readily obtain from its pages all the information that he can possibly require in reference to most of the insect friends and foes of his trees and bushes. The copious illustrations, moreover, are so beautifully executed and so true to nature that any insect referred to can be at once identified, and the proper mode of dealing with it learnt from the accompanying descriptions. But while the work is so practically valuable to those who are specially interested in fruits, we can assure our Entomological readers that they will find the volume to be an admirable scientific compendium, containing an epitome of the collective knowledge of the day, and bringing together into one convenient manual the results of the researches of all the leading Entomologists of America. We do not, indeed, think that we are speaking too highly in praise of the work—though we admit that it is saying a very great deal—when we express our opinion that Mr. Saunders' volume will take rank with that standard of excellence, Harris' *Injurious Insects of Massachusetts*, and that he has done for insects affecting fruits at the present day what his justly famed predecessor accomplished long ago for those injurious to vegetation in general.

The plan of the work, inasmuch as it is intended especially for the use of fruit-growers, is the most satisfactory that could be adopted. The insects treated of are grouped together under the name of the particular fruit that they affect, and are arranged in order according as they attack the root, the trunk, the branches, the leaves, the fruit itself. If, therefore, a gardener finds an insect of whose habits he is ignorant, and whose name he has never heard, doing some damage to one of his fruit-bearing trees, or bushes, or vines, he has only to observe to what part of the plant the attack is directed, and then he can at once turn to an illustrated account of the pest, and learn from it all its life-history and what remedies he may most effectively employ for its extermination. On the other hand, if an Entomologist wishes to know in a condensed form what information is available respecting an insect that comes within the scope of the work, he can at once find what he requires by means of the carefully prepared synonymical list and complete index at the end of the book.

The volume is beautifully printed on fine paper, and neatly bound in

cloth; the illustrations—440 in number—are thoroughly well done by competent artists and engravers. The fruits under which the various insects are grouped are twenty in number, viz., the apple, pear, plum, peach, apricot and nectarine, cherry, quince, grape, raspberry, blackberry, strawberry, red and white currant, black currant, gooseberry, melon, cranberry, orange, olive, and fig. As an example of the completeness of the work, we may mention that no less than sixty-four different species of insects are treated of as injurious to the apple alone, besides a number of beneficial parasites, and that these are made clear to the ordinary reader by one hundred and forty-five wood cuts.

We trust that the work will soon find its way into the hands of every intelligent fruit-grower, and that fresh editions of it may continue to be called for during many years to come.

C. J. S. BETHUNE.

Insects Injurious to Fruits; by W. Saunders. Philadelphia: Lippincott, 1883, 8vo. Illustrated with 440 wood cuts, pp. 436. Dedicated to the Fruit-Growers of America.

No one will deny that this book supplies a long felt want, and supplies it well. The author's long and well-known experience as a fruit-grower and entomologist, gives just the qualifications necessary for such work. He knows exactly what fruit-growers want, and in which way and manner the needed information should be given to be useful and at the same time pleasing. Therefore the plan of this book is simple and to the point; the treatment of the enemies plain and sufficient, without tedious length; the remedies recommended backed by experience, and such as can be used by every one. All this seems very simple and easy, just as if everybody could do it. Often, I suppose, will it be said, Why was this book not published long ago?—It is so eminently practical! But it is much easier to give long detailed descriptions than short ones, specially adapted to certain purposes. It is much easier to enumerate a number of proposed remedies than to select just the right one. After all, we should not forget that during late years the busy and prominent students of economic entomology have advanced this department of the science in a manner never equalled before this time.

The plan of the book is as follows: Twenty different fruits—all eatable without preparation (except quince and olive)—are treated in so many chapters. The insects injurious to them are arranged as attacking root, trunk, branches, leaves, fruit, always followed by the enemies of those

enemies—the beneficial insects. The species are profusely illustrated with excellent, often superior wood cuts; the well-known cuts of Mr. C. V. Riley are largely represented, and rather dangerous for all others.

The plain and judicious manner in which remedies are recommended is a decided and prominent feature of the book. There are no ambiguous, no large-mouthed sentences, no humbug about millions lost by such an enemy, or millions saved by such a remedy. There is nothing but plain truth, said in the most unpretentious words. I think every scientific student is deeply obliged to the author for his happy innovation.

Of course the author has, besides his own large experience, used all the rich and splendid discoveries and observations published by other scientists. The absence of quotation marks is entirely justified, as they belong to the history of the natural history, but not to a practical book intended for fruit-growers. Scientific students know where such facts are published, and the author has in the preface fully satisfied all economic entomologists with his acknowledgments. It is obvious that in a book treating of the history of so many species, omissions and sometimes errors cannot be entirely avoided. Since the book is issued and the errors are insignificant, we may safely leave them to be corrected by the author himself. *Bene meruit!*

DR. H. A. HAGEN.

IMPORTANT TO ENTOMOLOGISTS.

In accordance with a resolution passed at a meeting of the Entomologists in attendance at the Montreal Meeting of the American Association for the Advancement of Science, in August, 1882, authorizing me to call and “to provide for similar meetings for Entomological discussions at the future annual gatherings of the Association,” I herewith name Wednesday, August 15th, 3 o'clock p. m., as the time for the first of the series of the Minneapolis (Minn.) meetings, the place of meeting to be named hereafter.

All interested in Entomology are respectfully invited to attend the meetings, and participate in the discussions.

J. A. LINTNER.

Albany, June 1, 1883.

I have gathered, since the leaves fell, twenty-one cocoons of *A. luna*, and each one bears evidence that it was spun after the larva left the tree on which it fed.

WARNER W. GILBERT, Rochester, N. Y.

The Canadian Entomologist.

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No. 7

NEW SPECIES AND NOTES ON STRUCTURE OF MOTHS AND GENERA.

BY A. R. GROTE, A. M.

(Continued from Page 87.)

SYNEDOIDA MUCRONATA, n. s.

Eyes naked, lashed. Labial palpi with long cylindrical narrow third joint; second joint heavily scaled. Abdomen untufted. Of an inconspicuous fuscous or brownish gray, sprinkled with pale points, markings all concolorous with the wing. The t. p. line is brown and distinct at costa, forming a strong tooth opposite cell, below this it is rounded over median nervules and fainter. Sub-terminal line straight, distinct, even, brown, and well marked. Reniform concolorous, constricted, with pale edging. T. a. line even, slightly arched. A terminal dentate line; fringes brownish. Hind wings sub-pellucid, iridescent whitish, with soiled veins, with vague brownish borders, beneath with dark dots on primaries, which become a clouded spot. Body brownish gray. This species has the form of Mr. Morrison's *Teniocampa vegeta*, but is of an ochrey fuscous gray, not at all reddish, or brown with a red tinge. Arizona. Coll. B. Neumoegen, Esq. Expanse 33 mil. Tibiæ apparently unarmed.

LITOGNATHA LINEARIS, n. s.

♀. A small species, powdery fuscous, with the fore wings shaded with gray. Inner line single, a little curved; outer median line distinct, dark brown, a little flexed, even, followed by a pale edging. S. t. line a faint pale shade. Outer portion of the wing darker shaded. Hind wings concolorous dark fuscous. Beneath paler with a faint dark common median shade. Head and collar somewhat ochrey. Arizona. Coll. B. Neumoegen, Esq. Expanse 18 mil.

I refer this species here doubtfully. It has something the look of a *Thalpochares*, but the neuration seems to differ decidedly.

SPARGALOMA PUNCTIPENNIS, n. s.

♀. I have only one specimen, which may not belong here. The wings are somewhat narrower than usual, the apices very pointed. The long terminal joint of the palpi is somewhat flattened. The color is a saturated ochre, somewhat pale. The fore wings are crossed by two thread-like, dark median lines, the outer produced opposite cell, the inner with a prominent indentation at middle, on cell. Median shade indicated. Reniform large, concolorous, outlined. A minute black dot before internal angle on the subterminal line. Hind wings darker, with a mesial line and following blackish subterminal shade. Beneath ochrey. Head and collar darker. Arizona, Coll. B. Neumoegen, Esq. Expanse 24 mil. The colors are those of *Zanclognatha*, but the structure, so far as I can judge of the single female I have before me, is more like *Spargaloma* than any genus known to me.

In this paper I have described a number of *Noctuide* which have been of great scientific interest. They have added to the number of strong genera, defined by natural characters, such as *Fota* and *Rhodosea*, and in addition we have forms which are remarkable from the fresh combination of characters which are found in other genera, such as *Carneades* and *Trichorthosia*. Undoubtedly this gradual work towards a comprehension of our Noctuid fauna has the disadvantage of being fragmentary, but it is inseparable from the conditions under which the new material is received. It is, I hope, all put into such shape that it can be used by the future monographer of the Family, which latter is probably the most extensive among the larger moths.

HADENELLA, Gr.

This genus is founded on a small species which at first sight looks like a small *Oncocnemis*; but there is a minute basal tuft on the abdomen, the thorax is thickly scaled behind, the vestiture is distinctly scaly. The lashless eyes are naked. The front is remarkable for a prolonged tubercle having a subcordate terminal face slightly impressed. Antennæ simple, ciliate. The fore wings are entire, sub-triangulate, with well produced apices. The labial palpi are short, with small terminal article, just exceeding the infra-clypeal plate. The type, *H. Pergentilis* Gr., has gray wings shaded with light ochrey or fawn. The orbicular oblique, pale-ringed with blackish centre; below it the longer claviform is similarly indicated. The reniform is transverse, black. There is a black, pre-

apical, inwardly oblique shade, edged with pale. The fawn color spreads over apical region and obtains at base and over middle of wing. The interlined fringes are dotted black and white. The lines are obsolete; costal marks distinct; veins dotted. A subterminal brownish shade followed by blackish, especially at anal angle. Hind wings pale fuscous. Washington Territory (coll. by Mr. Morrison).

YPSIA UNDULARIS.

I have been unable to find any spinules on the tibiae of this species.

YPSIA UMBRINA.

In this species (*Phococyma umbrina*) the tibiae are also unarmed.

HOMOPTERA UNILINEATA.

In this species the middle and hind tibiae are spinose.

MATIGRAMMA RUBROSUFFUSA.

In this species the middle tibiae alone are spinose, and strongly so.

HOMOPYRALIS MISERULATA.

In this species the slender tibiae are unarmed.

PETROPHORA EXCURVATA, n. s.

This species may be known by the markings being more distinct beneath, where the wings are crossed at the middle by a deep brown band filling in the outer median space between the median shade and the outer median line, the latter darker, pointed opposite the cell on fore wings and roundedly exserted in the same place on secondaries. A subterminal series of scalloped brown shades edged with pale outwardly. Fringes checkered. Fore wings with pointed apices; hind wings produced medially; the fringe has a dark even line at base. Above, these markings are more faintly reproduced; the s. t. line pale; the outer median line notched below costa, followed by a pale line. Beneath there are small linear discal marks on both wings. One specimen. Colorado, Coll. B. Neumoegen, Esq. Expanse 27 mil.

PETROPHORA MIRABILATA, n. s.

Allied to *Hersiliata*. Thorax and base of fore wings carneous gray; abdomen whitish. A sub-basal bright fleshy-brown band angulated on its outer edge on submedian fold. Median space blackish gray, straightly limited outwardly, narrowed on submedian fold by the tooth of the inner line, widest at costa, crossed by indistinct dark lines, followed by a broad clear fleshy-brown band edged with white outside of the outer median

line, extending to apices on costa, leaving the terminal space narrowly blackish gray, cut superiorly by the faint, white subterminal line; fringes checkered. Hind wings ochrey whitish, with a faint dot and transverse lines. Beneath, four discal dots; the wings are whitish gray, irrorate to the subterminal pale, fleshy-brown band: lines on hind wings more distinct; markings of primaries reflected from above. Arizona. Coll. B. Neumoegen. Exp. 25 mil. The nearly perpendicular outer median line of primaries, edged with white, and the bright submedian and subterminal fields, distinguish it.

CYMATOPHORA (BOARMIA) GRISEARIA, n. s.

♀. This species may be known by its large size, its clear black and white, pepper and salt color, in which the white largely predominates; its resemblance to *Amphidasys*. White irrorate with black. Lines very distinct, black; the outer continuous, scalloped and produced on the veins; continued equally distinctly across the concolorous hind wings. Median and sub-basal lines near together, originating from costal spots. Subterminal line obsolete; a black cloud on terminal field opposite cell; a slighter one before anal angle. On hind wings there are also some vague black terminal cloudings. A faint festooned terminal line marked by black points. Beneath vague, pale, discoloured; discal marks faintly marked. Body like wings. This cannot be the female of *Pulmonaria*. Body like wings. Arizona. Exp. 36 mil. Coll. Neumoegen.

CYMATOPHORA (BOARMIA) SEPARATARIA, n. s.

♂. Allied to *Humaria*; the color is of an even mixed dove gray, the lines are accented and unequally distinct. Inner line roundedly oblique, marked on vein 1 and thence to margin; median shade line indistinct, near outer line, which is placed as in *Humaria*, uneven, produced on the veins. Discal mark indistinct. The black inner line is preceded by a faint shade line, and the outer line is followed by an indistinct shade line. Subterminal line whitish, toothed, upright, equally legible, followed by a black indistinct dentate line. The concolorous secondaries have the markings continuous, the median line distinct, discal mark indistinct. Beneath discoloured, very pale smoky, utterly immaculate. This species is intermediate between *Humaria* and *Crepuscularia*. Expanse 35 mil. Arizona.

CYMATOPHORA (BOARMIA) OBLIQUARIA, n. s.

♂. Allied to *5-linearia*. Pale whitish gray. Inner median line

black, roundedly oblique, continued as a black spot on extreme base of secondaries. Outer median line very oblique, running close to inner line below median vein, followed by a faint brownish shade. Subterminal field wide. S. t. line white, deeply scalloped, crossed by an oblique apical blackish shade; terminal border darker gray on both wings; a distinct scalloped black terminal line; hind wings toothed, copying primaries; faint discal ringlets on both wings; the median lines black on hind wings, the inner less complete. Beneath pale, the lines feebly reflected; four discal points. Female entirely dark gray, obscuring the lines, which can be made out to run as in the male, but are here finer, the white subterminal waved line evident on both wings. Beneath of a freckled dark gray; the four discal dots plain. Expanse, male, 24-26 mil.; female, 31 mil. Arizona.

CYMATOPHORA (BOARMIA) RUFARIA, n. s.

♀. This species is allied to *Separataria* ♀ in form and markings, but the hind wings are more cut off and straighter along external margin. The color is a pale reddish brown and is unusual. The subterminal line is whitish and distinct. Beneath, of a freckled brown with the four discal points marked. Above, the brown lines have the same course as in its ally; the outer median line somewhat sinuous, oblique. Expanse 34 mil. Arizona. Coll. Neumoegen.

TETRACIS GROTEARIA Pack.

Three males and two females from Arizona vary much in color and distinctness of markings. This is smaller than *Vidularia*, which has the disc of thorax discoloured, but otherwise is very near to Packard's species.

ENDROPIA SESQUILINEARIA, n. s.

♂. Very large and with the look of a *Caberodes*. Fore wings pointed, very shallowly excavate and roundedly projected at middle of exterior margin. Pale fawn ochrey, with two ochre brown lines on fore wings, and one (the outer) continuous over secondaries. Surface sparsely speckled. Four black discal points above and below. At place of subterminal line two pale flecks between veins 5 and 7, more distinct beneath, where they are edged inwardly by a line. Secondaries rounded. Allied to *Vinulentaria*. Expanse 42 mil. Arizona. Easily recognized and quite distinct from any other species.

APLODES ARIZONARIA, n. s.

Allied to *Packardaria* (*Rubrofrontaria* Pack., 386) as I understand the

remarks as to venation. Wings green, curiously mottled with pale, somewhat strigose. Inner line on fore wings obsolete. Outer line white, straight, bent on secondaries, which have no inner line. Costa of fore wings red, more distinctly so beneath. Fringes all pale. Vertex white, collar red at base; tegulae green; palpi red tipped; legs white, fore legs shaded with red. Exp. 30 mil. Arizona. Type Coll. Neumoegen.

This seems allied to the Californian *Anaploides Pistaccaria* of Packard, but the costa is wholly reddish above and below, beneath the wings are iridescent, pale greenish, without discal marks and only showing reflected the outer line. Above there are no discal marks. The two are evidently related; the legs are defective in my type, otherwise fresh.

CHLOROSEA ALBARIA.

♀. Head white on vertex; whitish on front, mixed with a few green scales. Palpi white, with a few dark scales at tips, rather short. Thorax greenish. Fore wings delicate green with two straight, parallel white median bands, rather near together, fringe white; the costal edge does not seem discoloured, it is somewhat whitish above. Beneath, the bands are reflected. Hind wings white, thinly scaled, translucent, without marks above and below, except a faint white discal mark. This moth should be known by its white secondaries, the pale green, somewhat mottled primaries, the median bands being straighter, and equidistant as compared with *Bistriaria*. One specimen (abdomen wanting). Arizona. Expanse 23 mil.

The hind wings are slightly greenish and iridescent, and very frail, but contrast by their white color with primaries. They do not look faded.

LITHOSTEGE ARIZONATA, n. s.

♀. Smaller than the described species. Fore wings fuscous, shaded over with white. Median vein white; the inner oblique dark line appears below it. The outer line is marked by black spots on the veins. Subterminal line white, straight, a little rounded, the apical veins marked with white before it. Fringes distinctly white and gray, checkered. Hind wings elongate, rather pale fuscous, immaculate. Expanse 20 mil. Arizona. There are but two dark lines on the wing; the inner very oblique and only marked inferiorly in the type.

TETRACIS OBLENTARIA, n. s.

♂. Two specimens with simple antennae and the hind margin of secondaries pointed in the middle, I would refer to Packard's *Parallel-*

aria, but the secondaries are lined above, the discal dots obsolete beneath and the lines are further apart; the general shape of the outer line and position is as given in his figure 43. Color of *Caberodes Metrocamparia*, a fawn ochre, varying in pallor. Two brown diffuse lines, edged with pale on fore wings; the inner upright, but more or less uneven, in one example toothed on costa. Surface slightly irrorate; a dark discal dot. Secondaries paler, with an incomplete mesial line, beneath more continuous and bent. A single outer common line beneath; in one specimen the discal points on primaries indicated. The inner line on primaries is obsolete beneath. Exp. 30 to 32 mil. Arizona. Two examples. Coll. Neumoegen.

TETRACIS SIMPLICIARIA Gr.

Two examples from Montana are smaller and paler than my Arizona type. In this species the wings are deep ochrey, the hind wings pale and unlined. The lines are pale on primaries, but one Montana male has them dark.

THERINA FERVIDARIA Hubn.

Two specimens from Arizona do not differ from the normal form.

SEMIOTHISA S-SIGNATA Pack.

In every variety. Sometimes the inner line is as distinct and broad as the outer. Sometimes the wing is ochrey, free from irrorations, again so blotched as to be nearly fuscous or blackish. I can find no grounds for naming the varieties, much less for finding different species. Arizona.

LUSSA, n. g.

A Hadenoid genus allied to PERIGEA, but of a singularly elongate form, recalling *Chilo*. Abdomen slender, twice as long as secondaries. Vestiture hair-like, mixed with rounded broader scales. Labial palpi curved up over the flattened front, the long hairs from the terminal joint reaching to base of antennæ. Eyes naked; ocelli present, but small. Legs unarmed. A tropical looking insect, at first sight seeming to be a Pyralid.

LUSSA NIGROGUTTATA, n. s.

♂. Antennæ simple. The insect has the look of a Pyralid, but the maxillary palpi are not present, and as far as I can see, the neuration is Noctuidous. Body long, linear, slender, squamation appressed; color a faded grayish clay, fore wings narrow at base, no marks but a few black dots, of which the subterminal series is continuous with a larger one at

internal angle. Costal black points mark the inception of the lines, which are partially expressed, fine and dentate or uneven. Hind wings iridescent with smoky borders. Collar edged with black. Expanse 26 mil. Indian River.

LYGRANTHOECIA TENUESCENS, n. s.

♂. I should refer this species to *Euleucyptera* had I described it before Mr. Smith's valuable paper appeared. The fore tibiae are abbreviate, on the inside with a long terminal claw, followed or preceded by two thin spinules; on the inside there is a much shorter claw opposite the long one at the extremity of the joint on the outside, followed by a still shorter claw. The primaries are like *Cumatilis*, but the white band is very narrow, shaped like *Hulstia*; here the colors are pale olive and silvery white. Base olive, then the white median band, broadest on costa; the outer portion pale olive cut by the rather broad white subterminal shade. Tibiae spinose; clypeus bulging. Differs structurally from *Antaplaga Dimidiata*. Exp. 22 mil. Arizona.

PYRRHIA ILLITERATA Gr.

This is described by myself before Mr. Morrison or Prof. French named it. Unfortunately I have not my type; if I recollect rightly, Mr. Thaxter has the species. It may be known at once by its brilliant orange red color, both wings alike, the markings of primaries black. It seemed to me to be Guenee's *aurantiago*, though the figure in the Species General hardly resembles it except in color (pl. 7, fig. 1). My *Heliothis Lupatus* is founded on a specimen given me by Meske from Bastrop Co., Texas. The types of both are now in B. Mus. *Lupatus* is very different in color (even from faded *Illiterata*) and apparently in markings, reminding one of *Heliothis dipsaceus*. The color is a saturated ochre, somewhat intense, and the insect was concolorous. To the best of my recollection, I determined this species in Mr. Neumoegen's collection correctly. I have no recollection of naming it for Prof. Riley; if so, I did it in Washington, away from my collection. I regret I have no notes on tibial structure of either of these species; I recollect examining the tibiae of *Lupatus* and finding them armed, hence my reference. Of the tibiae of *Illiterata*, I have no recollection. It was described many years ago, but I should quickly identify the species, which I had no doubt was Prof. French's (as I compared them). Mr. Smith's remarks reveal an unexpected similarity between these insects, which can readily be cleared up the moment I get a specimen of *Illiterata* again in my hands.

TRICHOLOITA INCONSPICUA, n. s.

♂. Antennæ bi-pectinate; front smooth; eyes hairy; tibiae unarmed. Fore wings fuscous with obliterate markings. Reniform white, moderate, orbicular a small white fleck. Fringes cut with pale. Hind wings whitish with vague border; minute discal dot visible beneath. This species is smaller than the other two, the reniform obtuse, with a central line, not L-shaped. Beneath the fore wings are pale, the discal dot set in a pale ring and unusual in appearance. Expanse 25 mil. Arizona. Coll. Neumoegen.

METALEPSIS Gr.

Male antennae bipectinate. Collar discolorous, slightly hollowed out. Eyes naked, lashed. Labial palpi not exceeding front, with small and conical third article. Tibiae armed. Abdomen untufted. Vestiture hairy. Wings entire. Body rather hairy. The type is:

1. *Cornuta* Gr. California.

This genus differs in the structure of thorax from *Pachnobia*, the type of which is *Carnica* from Europe, Labrador and White Mts.

PHEOCYMA TERMINA, n. s.

♀. Allied to *Edusina*. Basal field of primaries dark brown, darker than the wings, which are obscure brown. The t. p. line indented opposite the cell, following the shape of the inconspicuous reniform. A paler shade outside of the basal field; all the lines and shades inconspicuous. An oblique apical shade. The external margins in both wings denticulate, as are the fringes. Hind wings a little more yellowish brown with indistinct, transverse, somewhat undulate lines, the middle one distinct, dark brown. Beneath obscurely colored, white costal dots; extra-mesial line tolerably distinct, crossing both wings; secondaries crossed by several indistinct lines; a terminal series of illegible white points. Two or three specimens, Arizona. Expanse 30 mil. Types of *Edusina* are in Cambridge. I use this genus instead of *Homoptera*.

SEMIOTHISA PATRICIATA, n. s.

♂. Antennæ with very short teeth. Allied to *Multilineata*, but differing by the median line being single. Primaries falcate, crossed by three sub-parallel, deep brown lines; the inner with a costal tooth, the median arising from a costal spot, the outer almost imperceptibly bent at costa, all even, hardly oblique; the outer followed by a faint line margining inwardly the pale brown subterminal band, which reaches across both

wings and widens on secondaries. The outer line crosses a spot on median vein. The subterminal line is broader, paler brown, and is broadly marked on costa. Secondaries like primaries in color and distinct markings, dentate, tailed; a discal spot between the two vividly marked median lines. The color is a dove gray, except the brown subterminal band. Beneath diffusely shaded with blackish and yellowish, more coarsely irrorate, markings repeated. Head and antennæ yellowish. Very distinctly marked and peculiar. Expanse 26 mil. North Carolina. Coll. Neumoegen.

PROSOPARIA PERFUSCARIA, n. g. et s.

♂. Antennæ bipectinate. Above wholly dark fuscous, the primaries with two dark, tolerably propinquitous median lines, the outer continued over hind wings. Beneath paler, somewhat ochrey, with a common exterior dark shaded band. The insect has the appearance of *Fidonia*; the under surface differs by its uniform appearance. Expanse 18 mil. Arizona. Coll. Neumoegen.

This genus differs from *Fidonia* by the unusually long labial palpi, which are projected nearly straightly forwards, and extend for half their length beyond the clypeus. Front scaled with a median ridge, formed by the flattened scales meeting from both sides. Hind tibiae with two pair of spurs. Legs slender, closely scaled. The insect has the appearance of *Fidonia* (*Perconia*).

FIDONIA PARTITARIA, n. s.

♂ ♀. Allied to *Fimctaria*, but distinguished by the females being of a light ochrey. The male is fuscous, allowing two common lines to be faintly made out; the costa near apex shows two pale abbreviate bands, and a subterminal series of spots is inaugurated to be discontinued. Fringes checkered. The female is pale ochrey above, allowing two dusky lines to be seen, and with the costa still paler; a subterminal series of pale spots. Beneath the hind wings show three bands of nearly coalesced white spots, the basal band often broken; the base shows a white spot, the ground color, an olive ochrey, appears narrowly between the bands. In the male the ovate spots are reduced, silverywhite, separate. Fore wings with the disk fuscous, darker in male, the costal region ochrey, allowing the lines to be seen. Arizona. Several specimens coll. Neumoegen. Expanse, ♂ 16, ♀ 18 mil.

TELESILLA NAVIA Harvey.

No doubt exists in my mind that this is very different from *Cinereola* by its pallid, ochrey color, its darker median field narrowing inferiorly, bulging out opposite cell and better defined on both sides from the rest of the wing. The shape of the t. p. line is thus different from *Cinereola*, running in more below median vein. Mr. Morrison's species of *Telesilla* is Guenee's *Galgula*, and does not belong here at all.

SCOLECOCAMPINÆ.

Under this sub-family name I arrange *Doryodes*, *Eucalyptera*, *Scolecocampa*, *Phiprosopus*, *Cilla* and *Amolita*.

In my opinion, the genera of our N. Am. Noctuidæ are well enough defined in my writings, and in part in Guenee's, to arrange our species. What is needed is a nearer study of our fauna with the European. A merely arbitrary change in the location of the genera gives a color to a wide divergence in appreciation of character, which can no longer exist, since all the natural characters have been exposed by me. I have gradually changed the basis in literature of Guenee's genera and worked out their association in groups, which shed a light over the mass of forms in discussing them, but are sub-families without strong exclusive characters. Wider or more pointed wings, longer legs, or an exaggeration of character mark, for instance, *Scolecocampa* as compared with *Doryodes*, but the linear body, oblique palpi, (often smoky at the sides in this group) the dots on reniform, the pointed apices and slender feet, mark the group as a whole. In *Senta* the body is flat, the wings are Crambiform. It is a different type, and I leave it with *Nonagria* for the present. The body is nowhere so long and linear (*Chiliform*) as in *Doryodes* and allies.

I refer the student to my paper on *Cilla distema* (Am. Ent. 1, 100), where I show the affinity of *Scolecocampa*, *Eucalyptera*, *Cilla*, *Amolita* and *Doryodes*, all of which were known to me in nature. For this group, which I remove out of the *Nonagriinæ* M., I propose the term *Scolecocampinæ*. The structural differences between *Liburna* and *Bipuncta* are very slight, although there is so much difference in size; *Obscura* seems intermediate in this respect. I do not know, as I have elsewhere said, *Thaumatopsis longipalpus*. It cannot, I think, be *Cilla distema*, which is a pallid bipunctate form, without the median longitudinal shade which is characteristic of *Doryodes*, is marked in *Amolita*, and faint in *Euca-*

lyptera. The dotted discal stigmata (ringed also in *Liburna*) and smoky pallid colors, are characteristic.

The species have rostrate palpi, stretching forwards or but slightly inclined; variable in length, reminding one of *Crambus*, and as the insects are internal feeders in the larva state, as far as we know, the group is best placed between the Gortynas and Nonagrians. They seem to me a distinct sub-family group, the body being slender, even in *Scolecocampa liburna*, and long compared with wings, which are narrowest and most pointed in *Doryodes*. The legs are slender and long, comparatively, and unarmed. The structural features remind us of *Chilo* and the lower *Crambidae*. The sub-family *Scolecocampinae* is one of the most curious in the *Noctuidae*, and hardly yields to the *Nonagriinae* in general interest.

The species of this sub-family may be arranged as follows:

SCOLECOCAMPINÆ M.

SCOLECOCAMPA Guen.

1. *Liburna* Geyer.
 Ligni Guen.

EUCALYPTERA Morr.

2. *Obscura* Gr.
3. *Bipuncta* Morr.

DORYODES Guen.

4. *Acutaria* H. S.
 ? *Bistriaris* Geyer.
5. *Spadaria* Guen.

AMOLITA Gr.

6. *Fessa* Gr.

CILLA Gr.

7. *Distema* Gr.

ADIPSOPHANES TERMINELLUS, n. s.

In this genus the collar is roundedly bulged in front, and there is a small tuft behind it. The wings are finely lined, *Cucullia*-like, and the slender gray species have white sub-pellucid secondaries, which in *Miscellus* have diffuse smoky borders, but in *Terminellus* have the apical edge marked with blackish fuscous while the wing itself is pure translucent white; while in the type species it is slightly smoky. The new form, from Texas, is a little more robust than *Miscellus*; it differs by the terminal space on fore wings being shaded with blackish, the lines on interspaces

distinct, black ; the median lines marked in black on costa : the outer line continued outwardly some distance and then broken into dots ; the inner line apparent again at internal margin. The smoky median shade apparent near the t. p. line. Otherwise *Terminellus* much resembles the less distinct *Miscellus*, from which a quick distinguishing mark is further a black band across the pallid front. Palpi gray at tip and beneath. Under surface white and very distinct by the dark contrasting terminal field, the outer median line again appearing and vividly black on costa. Fringe checkered. Hind wings beautifully iridescent, no discal marks. In my collection.

CLEORA VENATA, n. s.

Male and female. This differs by the male antennæ being simple, not plumose ; from *Agrovenaria* by the outer black median line arising near the apex, accentuated on the veins. The veins are more or less black. Coarsely speckled with brownish black and very pale ground. Inner median line with a long, large tooth on cell reaching to discal mark. A dotted mesial line on the paler irrorate secondaries, which show a faint discal dot. One male variety has the median space suffused with blackish brown. Body pale. Size large. Outer median line less oblique than in *C. Umbrosaria* ; it is indented opposite cell and runs again inwardly below vein 3. Beneath paler with reflected coarse speckling and outer dotted line. Fringe checkered. Expanse 40 mil. Three examples from Montana in Mr. Neumoegen's, one in Mr. Hill's collection.

SEMIOTHISA DENTICULATA, n. s.

♀. The outer margins are dentate, not "tailed" on secondaries, with a distinct brown line and tinge. Wings of a clear white above, the primaries crossed by four faint brown lines marked on costa, the subterminal faint. Opposite the cell the outer line and the subterminal beyond it are slightly accented with blackish. The outer median line is accented and the strongest marked. The hind wings somewhat speckled. This species may be known by its china-white tint of both wings above, the surface being very slightly powdered with gray, and the brown terminal line and dentate margins of the wings. The body is grayish-white and beneath the bands and costal edges are ochrey ; a fuscous shade, cut by the ochrey veins, following the third or outer median line. The legs are ochrey or yellowish. California. Exp. 25 mil.

REPORT OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO
TO THE ROYAL SOCIETY OF CANADA, MAY, 1883.

The Royal Society of Canada having invited the Entomological Society of Ontario to send a delegate to their recent meeting in Ottawa, the Council recognizing the importance of the work undertaken by the Royal Society and anxious to do all in their power to further the advancement of Science, especially in the department of Natural History, appointed Mr. James Fletcher, of Ottawa, to represent the Entomological Society on that occasion. Mr. Fletcher was present, took part in the proceedings and submitted the following report:

To the President and Members of the Royal Society of Canada:

GENTLEMEN,—In response to the invitation received by the Entomological Society of Ontario to send a delegate to the meetings of the Royal Society of Canada, the Council of Management gladly avail themselves of the privilege so accorded them of being represented on this occasion.

As their delegate I shall endeavor to submit for your information, in as brief a manner as possible, some of the main features relating to the origin and progress of the Society, now so well known as the Entomological Society of Ontario. It was organized in 1863 under the name of the Entomological Society of Canada, by a few naturalists living in different parts of the Provinces, who met together at Toronto for this special purpose. Its membership, at first, was only 16, and this number included all those then known to be interested in the study of insect life in Canada. From this small beginning the Society has steadily increased until its membership now reaches upwards of 500.

The benefits of organization and united effort were soon manifested by the rapid accumulation of valuable facts relating to scientific and economic entomology. Formerly this material was, from time to time, published in the pages of the Canadian Journal; but the increased interest in the work of the Society, and its larger membership, rendered it necessary in a few years to establish a periodical of its own, entirely in the interests of Entomology. On August 1st, 1868, appeared the first number of the CANADIAN ENTOMOLOGIST, a monthly periodical which has from that time forward been regularly issued, and which was for some years the only publication on the continent of America devoted solely to this important branch of natural science. It has now reached its fifteenth volume. From the outset its pages have been almost entirely filled with the records of original

work ; and during its existence it has been the means of disseminating a vast amount of scientific knowledge, which has been of benefit not only to Canada, but to the world at large. In this connection it may not be out of place to quote the opinion of one of the leading American entomologists. Prof. Grote, of New York, in his late work on the Noctuidæ, when enumerating the sources of information of value to entomological students, speaks of the organ of our Society in the following complimentary terms :

“ The treatise of Dr. Harris, which has become classical on its subject, “ did much towards creating a general interest in entomology. But the “ publication of the CANADIAN ENTOMOLOGIST, a journal aided pecuni- “ arily by the Ontario Government, and owing its success chiefly to the “ unselfish labors of Mr. William Saunders, has assisted the progress of “ entomology in America probably more than any one other similar “ undertaking.”

The work of our Society has also been favorably commented upon abroad, and a regular system of exchange of publications has been established with many of the important learned Societies of Europe. In addition to the good work done by the issue of the CANADIAN ENTOMOLOGIST, collectors have been materially aided in their studies by the classified lists of the different orders of Canadian insects which have been published as the material for the purpose was gathered together. The extensive collection exhibited by the Society at the Centennial Exhibition at Philadelphia, attracted much notice, and was admitted by all who saw it to be most creditable to Canada. At the request of the Dominion Government a similar collection has been sent to England as part of Canada's contribution to the International Fisheries Exhibition.

Beyond this purely scientific work; the Society has, in a series of 13 Annual Reports on Insects Injurious and Beneficial to Agriculture, given to the farming community a large amount of useful information.

The Government of Ontario recognising the good work thus accomplished, incorporated the Society as the Entomological Society of Ontario under the “ Agriculture and Arts Act ” in 1870 ; and at the same time gave material aid by allowing a liberal annual grant from the public funds.

In view of the necessity for the constant interchange of specimens between students in every department of natural history, in order that, by comparison of other forms, their studies may be thorough, the Entomological Society of Ontario respectfully suggest that the Royal Society of

Canada should use its influence to secure a more liberal interpretation of the postal regulations, with reference to the exchange of specimens between students in Canada and those in the United States and Europe, particularly in the closely allied sciences of Entomology and Botany.

And it would also further suggest that a representation be made to the Government to the end that arrangements be made whereby scientific bodies may be permitted to import, free of duty, any engravings, woodcuts, lithographs, electrotypes, or other illustrations which they may require for their publications.

The members of the Entomological Society of Ontario have learned with much pleasure that the Royal Society has already taken some steps towards the establishment of a National Museum, and believing that such an institution would very appreciably assist the whole cause of science in Canada, they take this opportunity of assuring the Royal Society that they will be pleased to help in every way in their power towards this end by collecting specimens or otherwise.

Signed on behalf of the Council,

Ottawa, May 22, 1883.

J. FLETCHER, Delegate.

DESCRIPTION OF A NEW SPECIES OF THECLA FROM FLORIDA.

BY W. H. EDWARDS, COALBURGH, W. VA.

THECLA WITTFELDII.

MALE—Expands 1.5 inch.

Upper side black-brown; primaries have a large oval stigma; secondaries have the edge of hind margin on posterior half pale metallic blue; a large fulvous spot in second median interspace over a black spot on the margin; two tails, the posterior one very long, measuring .24 inch on anterior side, the other .1 inch; black, tipped with white; fringes of primaries fuscous, of secondaries same to upper median nervule, then white, and next anal angle, long, brown, with a whitish line running through them.

Under side dark brown, the hind margins narrowly edged by white; the costal edge of primaries next base red; both wings crossed by two macular white lines, the outer one sub-marginal, nearly parallel to the margins, and quite regular, broken at the nervules, crenated on posterior

half of secondaries and ending in an oblique streak up the inner margin ; each spot edged black on outer side, and on primaries, in the median interspaces, there is more or less fulvous outside the black ; on secondaries is a large spot on the margin behind lower median nervule, made by blue-white scales on the brown ground ; and in the next interspaces are three deep red fulvous spots, diminishing gradually in size, the outer one sometimes obsolete, the largest with a black patch on its marginal side : anal angle black, overlaid on inner margin by white and a red streak ; the inner of the two lines is extra-discal, somewhat irregular, especially on secondaries, and joins the other at the lower median nervule of secondaries, then makes an angle in sub-median interspace, and ends in a streak up inner margin : in cell of each wing two parallel abbreviated white streaks or bars.

Female—Expands 1.7 inch.

Upper side as in the male, except the stigma ; the tails measure .26 and .12 inch respectively ; under side as in the male.

From 3 ♂ 1 ♀ taken by Dr. Wm. Wittfeld, at Indian River, Florida, 1883. This observer, in the past three years, has done more to elucidate the biological history of the Lepidoptera of Florida, than any one who has preceded him in that section, and he has discovered a remarkable number of new species of butterflies especially, and has introduced to the N. Am. fauna many other species both of butterflies and sphinges, which though previously described, had not been seen in the U. States. I take pleasure in naming this fine *Thecla* for Dr. Wittfeld.

The examples were sent me labelled *Faronius*, a species quite distinct from the present, which in several respects is near to *Calanus*. It differs from *Calanus* by the greater size, the very long tails, and in the inner of the two transverse lines beneath, which is single, whereas in *Calanus* this line is double, or chain-shaped ; the parallel bars in the cells are like those of *Calanus* ; also like *Crysalus*, and such bars are found in no other of the American species.

IMPORTANT TO ENTOMOLOGISTS.

In accordance with a resolution passed at a meeting of the Entomologists in attendance at the Montreal Meeting of the American Association for the Advancement of Science, in August, 1882, authorizing me to call and to provide for similar meetings for Entomological discussions at the

future annual gatherings of the Association." I herewith name Wednesday August 15th, 3 o'clock p. m., as the time for the first of the series of the Minneapolis (Minn.) meetings, the place of meeting to be named hereafter.

All interested in Entomology are respectfully invited to attend the meetings, and participate in the discussions.

Albany, June 1, 1883.

J. A. LINTNER.

RECORD OF ACTUAL DATES OF ISSUE OF CANADIAN ENTOMOLOGIST.

NOTE.—It is intended hereafter to give in each number of the CAN. ENT. the date of actual issue of the previous number.

We give the dates from Jan. 1, 1882.

Vol. XIV., No. 1, January — issued February 2, 1882.

"	"	2, February	"	"	28, "
"	"	3, March	"	March	31, "
"	"	4, April	"	May	18, "
"	"	5, May	"	June	14, "
"	"	6, June	"	July	26, "
"	"	7, July	"	August	21, "
"	"	8, August	"	October	18, "
"	"	9, September	"	November	18, "
"	"	10, October	"	December	14, "
"	"	11, November	"	January	5, 1883.
"	"	12, December	"	January	29, "

Vol. XV.	"	1, January	"	February	21, "
"	"	2, February	"	March	18, "
"	"	3, March	"	April	7, "
"	"	4, April	"	May	18, "
"	"	5, May	"	May	26, "
"	"	6, June	"	June	26, "

CORRESPONDENCE.

ZELLER'S COLLECTIONS, ERRATA, ETC.

Editor Can. Ent.: In a recent letter from Lord Walsingham I am informed that he has "just bought all the collections of the late Prof. Zeller." This will be good news for American Micro-lepidopterists, as

Prof. Zeller has described a great number of American species, and the types, in Lord Walsingham's possession, will be far more available for assistance in the determination of our indigenous species than they would be if placed in some continental museum. His Lordship has kindly given so much aid to those of us who are interested in his specialty, in this country, that we have sufficient reason to rejoice over the increased facilities for the study of our *Micros* which he will have in the possession of this far-famed collection.

Referring to his recent "Notes on American *Tineidæ*," Lord Walsingham wishes me to "point out with his concurrence and apologise for the error" that his genus *Idiostoma*—first characterized under the name *Idioglossa* in the Proc. Ent. Soc. of London, 1881, p. 273—is but a synonym of Frey and Boll's *Metamorphæ*, Stet. Ent. Zeit., 1878, p. 277—the species described in the "Notes" as *americella* Wlsm., being the same as *M. miraculosa* Frey and Boll.

In this connection it may be well for me to change the names of two species of *Gelechia* described by me in the December number of the CAN. ENT. for 1881, the names there published being, as I am informed by Lord Walsingham, pre-occupied by European species in the same genus. The name *formosella* for the species rolling leaves of laurel oak, is hereby changed to *vernella*, in reference to its occurrence in spring-time only, so far as I have been able to observe. *G. cinerella*, the species mining and crumpling the edges of the leaves of *Solanum Carolinense*, may hereafter be known as *G. inconspicua*.

The pretty little *Lithocolletis* described in the same paper under the name of *L. gregariella*, is, in Lord Walsingham's opinion, identical with Clemens' *L. desmodiella* (see "Notes," p. 202). Mr. Chambers, on the contrary, wrote me this spring that he was quite convinced that it was distinct from Clemens' species. Since specimens bred from the same plant and even from the same mine, vary in shade and in intensity of the ornamentation, it is not surprising that some quite marked differences should exist between examples mining *Desmodium* and those mining *Phaseolus*, and yet these differences may not be of specific value. Never having seen an undoubted specimen of *desmodiella*, I am not competent to express an opinion on this subject, and am quite willing to accept the determination of Lord Walsingham.

MARY E. MURTFELDT.

Kirkwood, Mo., June 12, 1883.

INSECTS AFFECTING DRUGS.

Editor Can. Ent.—Dear Sir : To the list of drug insects observed in this country, as given by Mr. Wm. Edwin Saunders in the May number of the CANADIAN ENTOMOLOGIST, I have two additions to make. One is the Tobacco-beetle, *Lasioderma serricorne* Fabr., a well known pest in many cigar factories in the U. S. I found this in a drug store at Detroit, Mich., where the larvæ had completely honeycombed a lot of rhubarb. The same habit of the species has been recorded by European writers. The second addition is *Cryphalus jalappæ* Letzner, a small, inconspicuous Scolytid beetle, probably originating from Mexico, which has been carried by commerce all over the world. It was first found by Mr. H. G. Hubbard and myself in 1874, in the Medical Laboratory of the U. S. Navy Yard at Brooklyn, N. Y., and later observed by myself in drug stores at Detroit, Mich. and Washington, D. C. It occurs only in *Radix jalappæ*. The species has to my knowledge never before been recorded from North America, but will no doubt be found wherever the drug mentioned above is kept.

Yours truly,

Washington, D. C., June 8, 1883.

E. A. SCHWARZ.

DAMAGE CAUSED BY ANTS.

Early in the month of June I discovered that certain portions of the flooring and supports of my verandah were giving way, and I accordingly sent for a carpenter to do the necessary repairs. On taking up the flooring I found two nests of large black ants, and examination showed that nearly the whole damage was caused by these insects. Large joists were very much excavated, and in some cases eaten completely through; two pillars or posts eight inches square were eaten out to a distance of some two feet from the floor, and unless prompt measures had been taken the corner of the verandah would in all probability have given way. I had noticed these ants for a couple of years back, but never dreamt that they were so numerous or were doing so much injury. I sent specimens to my friend, Dr. Hagen, and asked his opinion as to remedy. He writes me that the ant is *Formica ligniperda* Latr. (*Camponotus ligniperdus* Mayr). He recommends an application of boiling water in which soft soap has been largely dissolved.

E. B. REED.

The Canadian Entomologist.

VOL. XV.

LONDON, ONT., AUGUST, 1883.

No. 8

To the Editor of the Can. Ent.:

DEAR SIR,—I send you some remarks by Dr. A. Speyer upon certain forms and species of *Pamphila* which I recently submitted to him. I had especially called Dr. Speyer's attention to the *Comma* group, and as will be seen, he has very kindly compared them with *Comma* and its varieties, and gives his views at length. I have italicised certain portions of the paper, to which I desire to call particular attention; and have appended some notes of my own, written after carefully considering the views of Dr. Speyer, and a re-study of the forms spoken of. The excellent translation of Dr. Speyer's paper, was made by Chas. E. Aaron, A. M., of Philadelphia, at the instance of his son, Mr. E. M. Aaron, Curator of the Am. Ent. Soc.

Yours truly,

Coalburgh, W. Va., 1st July, 1883.

W. H. EDWARDS.

REMARKS ON THE HESPERIDÆ SENT TO ME BY MR. W. H. EDWARDS, OF COALBURGH, W. VA., IN JAN., 1883.

In order to be able to decide with some degree of certainty the question whether *Pamphila Nevada*, *Manitoba*, *Colorado*, *Juba* and *Sylvanoides (Columbia)*, proposed by Mr. Scudder as distinct species, are, together or separately, specifically different from the European *P. Comma* L., there would be need of a much larger suite of well preserved specimens of these forms than have been placed at my command; and perhaps even such a suite would not have sufficed to establish a conclusion, but observation in the field alone would justify a final decision. What I have to say upon the subject, on the basis of the inadequate material on hand, is as follows:

It was my especial wish, in addition to the large number of specimens at my command of the typical *P. Comma* of Middle Europe, and of its

Arctic variety *Catena*, to be able also to compare specimens from the Asiatic part of its boreal faunal range with the American representatives of this widely diffused species.

Dr. Staudinger had the kindness to send at my request from his rich collections a supply of these from widely separated regions of Northern, Middle and Eastern Asia (from Amasia, Lebanon and other provinces, and from the Amoor country). There are among them interesting forms, differing more or less, and in some instances very materially, from the Middle European type. *The expectation that perhaps one or another of these might be identical with an American form, has not been realized.* Occasionally, it is true, an approach occurs, *but for the most part their variations from the type lie in a different direction than toward the American forms.* They afford, however, ample evidence of the great variability of the species under the pressure of various climatic and other external conditions.

In the structure of the body, and in the form of the antennæ, palpi and legs, I have been able to find no difference between Scudder's species and *Comma*. I was unable to examine the male abdominal appendages. The coloration of the under side varies considerably, but offers no available characteristics for the separation of individual forms. Sometimes the secondaries are distinctly veined. Also as to the bright or dull colors of the square spots, their extraordinary variation of size, the presence or absence of their black border, no exact forms can be defined, as all these pass into each other by imperceptible gradations.

Juba differs from *Comma*, as also from its American congeners, in several particulars. I compare four specimens of this form (one pair from Utah and another from California), all unfortunately more or less worn and mutilated. They answer well to Scudder's description and illustration (Mem. Boston Soc. of Nat. Hist., vol. ii, p. 349, pl. x., figs. 19, 20), except that the primaries of the female are more pointed than shown in fig. 20. (1). *Juba* is larger than *Comma*. (2). It has a somewhat different outline of wings, a long, slightly concave costal margin and a more oblique border of the primaries, which causes the apex of the wings to project more prominently. (3). The ground color of the primaries is a bright orange, especially in the female; the brown marginal band very dark, and toward the lower end much more sharply defined than in *Comma*. It presents on the inner side strong rounded or toothed projections, while the bright ground-color on the branches of the median vein

and of the dorsal vein extends far into it. On the upper side of the secondaries the orange forms on the dark ground very broad macular bands. (4). The discal stigma of the male is longer than in *Comma*, proportionately narrow, its upper end pointed and distinctly bent, not so straight as in *Comma* and in the other American species. (5). In the female, two dark-brown spots, separated by the second nervule, stand out very prominently on the bright ground in the disk of the primaries, and between them and the dark margin is a broad space of clear orange. In *Comma* ♀ the two spots are also present, but mostly united, and cohering with the dark spot below the apex of the wings; but the two spots are not so dark nor so sharply defined and prominent as in *Juba*, and they are separated from the dark margin, not by a broad bright space, but usually only by a narrow macular band. The under side of the secondaries is in *Juba* as strongly sprinkled with fuscous as the variety *Catena*, and has also equally large, bright, white checkered spots. In one female (from California), the arrangement of these spots corresponds with *Comma* (*Catena*); in the other three, the row of spots is more irregular and broken, while the spot between the 4th and 6th nervules is quite separated from the 6th cell, and is placed nearer to the margin. In two specimens (male and female) the spots are united. Evidence is thus afforded that the form and order of these spots, even in specimens undoubtedly closely related, are subject to great variation.

Juba is in any case a very well-marked local form of *Comma*. If a comparison of a sufficiently large number of specimens should prove the above mentioned differences, or even a part of them, to be constant, then *Juba* might even claim to rank as a species. It is probable however that transitions will yet be found.

The few specimens of *Nevada*, *Colorado* and *Manitoba* which I am able to compare (2 of *Nevada*, 7 of *Colorado* and 2 of *Manitoba*) of course justify no positive decision as to Mr. Scudder's assumption that they are true species. *I can only say that their differences are not clear to me, and that the examples sent to me, as well as Mr. Scudder's figures, give me the impression rather of varieties than of specifically distinct forms.* Henceforth I will class them together in order to compare them, as a whole, with *Comma*.

In the size, shape, color and markings of the upper side of the wings, as well as in the form of the discal stigma, I find no variation from *Comma*; but in one particular none of the compared American insects

entirely agree with *European* and *Asiatic Comma*, namely, in the shape and arrangement of the white spots on the under side of secondaries. The interrupted row of spots beyond the middle of the secondaries in typical *Comma* consists, as is well known, of six more or less quadrangular spots separated by the nervules, two of which, often somewhat larger and oblong in shape, stand below the costal margin in cellules 7 and 6, one (a double spot) between nervules 4 and 6 opposite the middle cell, and also one in cellules 3, 2 and 1, which last usually has an appendage turned toward the inner angle. These spots form two rows which meet at an angle of from 65° to 90° , in the vertex of which stands the spot between nervules 4 and 6. The three upper spots always, and the three lower ones usually, form a straight row with the spot standing in the vertex of the angle; sometimes these lower spots stand somewhat out of line and farther from the spot in the vertex. The size of the spots varies in individual specimens very considerably; sometimes they become so small that they stand widely separated from each other, sometimes so large that they entirely meet. Rarely one of the spots is wanting (that in cellule 1 or in cellule 7). In the American specimens, on the other hand, the greatest variation in the form, size, number and arrangement of these spots is presented, even in such as Mr. Scudder includes in the same species (e. g. *Colorado*); and not one of them shows the form and arrangement of the spots as described in typical *Comma*. Even the two sexes in these forms seem to differ much more strongly than in *Comma*, which shows scarcely any recognizable difference between the male and female, except that in the latter the spots are usually larger than in the male. A second noteworthy difference between *European Comma* and its American congeners is that in the former the fringes on the under side are always spotted with fuscous, at least (in secondaries) on their lower half, while in the American forms the fringes are as a rule unspotted. Yet this distinction is not invariable, for two of the specimens submitted to me (a male of *Colorado* and one of *Manitoba*) have spotted fringes. There exists then, so far as I can discover, only the difference drawn from the under side of secondaries, which, if it were constant, would suffice to separate the American forms from *Comma*. But that it is constant appears to me somewhat improbable, on account of the very great variability which is shown in the shape, number and arrangement of the square spots in the American specimens of these forms; and *Juba* (as above remarked) gives a direct proof that we can not rely upon this feature. A second proof is furnished by Mr.

Scudder's figures of *Manitoba*, one of which, fig. 10, does not differ in any respect from many forms of European *Comma* in the character of the rows of spots, while the remaining figures (and still more decidedly my two natural specimens) deviate therefrom. We also conclude from Scudder's descriptions that in this point *Manitoba* can scarcely, if at all, be separated from *Comma* by any constant difference.

Finally, concerning the two specimens numbered 18 and 19, and labeled *Sylvanoides*,* I have first to remark that they, especially the female, do not agree well with Scudder's figures and descriptions. According to the latter, "two transparent spots" are said to be present in the female on the primaries, to which Scudder gives especial prominence as a characteristic feature (p. 352, plate x., fig. 21). In my female specimen (which is quite perfect) no transparent spots are to be seen, but the spots have exactly the color and form of those in *Comma*. *In fact this female entirely resembles an average small Comma female, with this difference, that the fringes are unspotted, and that the spot in cellule 7 on the under side of secondaries is wanting.* The latter difference is probably only an accidental one, as Scudder's figure shows this spot. *If I had taken this specimen here, I would have regarded it as without doubt an unimportant variety of Comma,* and I am inclined to believe that specimens may be found on Vancouver Island which do not differ from the female of typical *Comma*. *Even the differences of the male do not appear to me of sufficient importance to make it possible to regard this Sylvanoides as anything more than a local form of Comma.*

I know Boisduval's description of his *Hesperia Sylvanoides* only from Morris's translation (Synop. Lepidop. N. Am. 1862, p. 107). Judging from this I should be much inclined to doubt that *Sylvanoides* Bdv. and the earlier *Columbia* of Scudder are the same species. Had Boisduval himself had such specimens as those now under discussion, he would probably not have regarded them as specifically different from *Comma*, but if he had done so, he would certainly have likened them, not to *Sylvannus*, which they resemble very slightly, but to *Comma*. Not one feature in the description of the male butterfly can be applied to Scudder's species.

The result of my comparisons may be thus summed up, namely: *that among the examples of Scudder's four species transmitted to me, not one*

* i. e. *Sylvanoides* Sc., but not of Bois. The latter — *Sonora* Sc.—W. II, E.

is found which agrees perfectly with European Comma; and, on the other hand, that the existing differences appear to me of too little importance, and above all not sufficiently constant to make it possible on the strength of these to declare the American forms specifically different from Comma. Comma is in a high degree under the influence of various external life-conditions, and, as both the American and the Asiatic forms prove, a species varying in different directions. Whether any one of these local forms has already sufficiently established itself to be able to rank as a distinct species, others, who are equipped with more abundant materials, will be able to decide with more certainty than myself.

2. The insect No. 37, sent to me as *Amblyscirtes Libya* Scud., does not belong to *Amblyscirtes*, and in general not to the group *Pamphilinæ*, but to *Pyrginæ*. (On this point you will please compare my paper in the *Stettin Entomol. Zeitung* for 1879, p. 484). It appears to me that it would be best to include it in the genus *Pholisora*.

3. No. 38 (labeled *Pholisora Nessus* Edw. = *Spilothyrus notabilis* Strecker) certainly stands most nearly related to the European species of *Spilothyrus* Dup. (whose older name, *Carcharodus*, Mr. Edwards will doubtless reject on principle as one of Hübner's), but it deviates from these in a few very essential points. The club of the antennæ is not oval, but much more slender than in the former, quite crescent-shaped as in *Nisoniades*; the outline of the wings is another point; the primaries are slightly rounded on the inner margin, somewhat incurved at cellule 16, and projecting bluntly with their posterior angle, which has long indentations, none of which is the case in *Spilothyrus*. The sharply indented secondaries are distinctly incurved between nervules 4 and 6. The covering of the body is close and smooth, not so hairy as in *Spilothyrus*, etc. If several similar species should be discovered, these differences would justify the erection of a separate genus; until then *Nessus* may stand with *Spilothyrus*. The male will probably be furnished with a costal fold.

As *Spilothyrus* differs from *Pyrgus* in nothing but the small transparent spots on the wings and the strongly indented secondaries, I have not separated the seven European species generically from *Pyrgus* (compare *Stettin Entomol. Zeitung*, 1878, pp. 179 and 188), but have only characterized them as its first group. Acquaintance with this American representative would incline me to concede their erection into a genus.

4. All the remaining species (Nos. 20-36)* properly belong to Pamphila. Only *Viator* (20, 21) differs from the type of the genus somewhat in the outline of the wings; the secondaries are broader and their border seems to be somewhat wavy. Also the last joint of the palpi is longer than usual. This species will necessarily stand at the beginning or at the end. As for the rest, I can pronounce no decision as to the most judicious order of succession of the species, as I possess no American Pamphilas, having handed my earlier collection over to Dr. Staudinger.

NOTES ON DR. SPEYER'S PAPER.

BY W. H. EDWARDS.

1. Contrary to my expectation, the Asiatic forms of the *Comma* group are not so near the American as are the European. Dr. Speyer tells us that the former vary from typical *Comma* in a different direction from the latter. If the American are derived from the European, or the reverse, the Asiatic ought to lie between the two, apparently.

2. I am satisfied that *Juba* should rank as a species. Dr. Speyer gives sufficient reasons for this, and examination of many examples confirm this view. I have a beautiful variety of *Juba* (male) sent me by Prof. Snow, and taken by him at Los Vegas, N. M., in 1882. The upper side is darker—more fuscous and less fulvous—than any other example I have seen, and secondaries beneath and the apical area of primaries are densely dusted with golden-green; the spots white and somewhat smaller than in the type. I call this var. *Viridis*.

3. As to *Manitoba*, *Colorado* and *Nevada*, Dr. Speyer points out that in these three forms the shape and arrangement of the spots on hind wings are not the same as in the typical *Comma* of Europe. So far as I can discover, on examining a considerable series of each of these forms, from divers localities, the differences are constant. In the matter of the spotted fringes spoken of, Dr. Speyer says these are *always* found in *Comma*. In the American forms they are sometimes present, but do not appear in all

* *Viator*, *Byssus*, *Pittacus*, *Deva*, *Ocola*, *Eufala*, *Panoquin*, *Fusca*, *Nereia*, *Phylace*,

the forms of which examples are under view ; and where they do appear seem rather to be exceptional, the rule being against the spots ; thus,

Of *Colorado*, 1 male, 1 female have spotted fringes, 3 males, 5 females, not.

" <i>Nevada</i> , none	"	"	"	6	"	6	"	"
" <i>Manitoba</i> , 2 females	"	"	"	5	"			"
" <i>Columbia</i> , none	"	"	"	6	"	1	"	"
" <i>Idaho</i> , "	"	"	"	3	"	3	"	"

This last, *Idaho*, I describe as follows : Upper side of both sexes like the palest, or most yellow-fulvous, examples of *Colorado*. Under side yellow, or gray-yellow (*Colorado* is described by Mr. Scudder as from olivaceous to griseous-green) ; the spots white, and as in *Colorado*. This form comes from Oregon, Washington Terr. and California. I consider that it may properly be called a variety of *Colorado*.

The occasional presence of the fringe spots in the American forms of this group may be sufficiently accounted for on the theory that the European, Asiatic and American forms are of co-ordinate value, and inherited these spots from their common ancestor. In the American they have disappeared, but occasionally the character is recovered by reversion. Mr. Scudder's types are distinct enough, in case of *Manitoba*, *Colorado* and *Nevada*, and I think we shall have to consider them as so many species. As they are not varieties of *Comma* they can stand alone. Dr. Speyer notices that in all these forms the two sexes seem to differ much more strongly than in *Comma*, "which shows scarcely any recognizable difference between the sexes, except that in the female the spots are usually larger than in the male." Certainly that is a strong point also ; and I find the differences spoken of to be constant.

4. As to *Columbia*, etc., later called by the same author *Sylvanoides* Bd. (It was, however, *Sonora* Sc. which Boisduval had named *Sylvanoides*.)

Of this form, I have 7 males, 1 female, and one male and the female bear Mr. Scudder's own label, and this female was the one submitted to Dr. Speyer. Mr. Scudder points out two characters by which *Columbia* may be identified. 1. The patch of brown on lower side the stigma in male. 2. A quadrate transparent spot in the lower median interspace of fore wing of female, and a partially transparent triangular patch next above this. And adds : "These are not given with sufficient distinctness on the plate." On the plate is a white space in each of these patches, which so far represents the transparency, I suppose.

As to the first character, the brown patch behind the stigma; it is present in my type male, but in the other males it is wanting; in 3 there is a slight duskiness behind the stigma; in 3 there is nothing even of this. Yet on the under side these males all agree with the type in color and in the peculiarities of the band of spots on secondaries.

2nd. The female has nothing whatever of the transparency mentioned. These two patches or spots are precisely like the two above them and against the cell, so far as color is concerned, all being simply fulvous. Mr. Scudder continues: "Beneath, a silvery white (male) or pale (female) slender belt of small quadrate spots, similar to that of *P. Comma*, bent at a little less than a right angle, the portion at right angle to the inner border straight and continuous, the other portion sometimes broken, sometimes continuous and straight. This species has only been taken, and rarely, in California." My type male was from Vancouver's Island, the female from California. The other males are from Wash. Terr., Brit. Col. Arizona.

It is of the female mentioned that Dr. Speyer says it "entirely resembles an average small *Comma* female, with this difference, that *the fringes are unspotted, and that the spot in cellule 7 is wanting.*" But as Mr. Scudder's figure shows the spot, this difference Dr. Speyer regards as accidental, and continues: "If I had taken this specimen here, I would have regarded it as without doubt an unimportant variety of *Comma*. Even the differences of the male do not appear to me of sufficient importance to regard this *Syltanoides (Columbia)* as anything more than a local form of *Comma*."

Dr. Speyer sent me a typical male and female *Comma*. Of the male, the color of under side of hind wings and apex of fore wings is greenish-yellow. Every one of my *Columbia* males and the female (which Dr. Speyer notices) lacks the spot in cellule 7, which is present in both these *Comma*. This spot is present in Mr. Scudder's figure of the female (fig. 22), but not of the male (fig. 23), and I apprehend that it is in the female figure by a mistake on the part of the lithographic artist, and was overlooked by Mr. Scudder. None of my males are of the color of *Comma* on under side, all being brown, not green, and on all, the spots at the angle of the band are suddenly reduced, and are small; whereas in the *Comma* they are large. The band in each of these forms has a distinct character of its own. The under side of the female *Columbia* is nearer to the female *Comma*, but more yellow, less green; the spots are confluent.

ent, as in the male, and not separated, as in the *Comma*; the spots are clear and silvery white, not yellowish, as in the *Comma*. As before said, the spot in cellule 7 is wanting, and there are no fringe spots to either sex. Examining the other American forms as to the presence or absence of the spot in cellule 7, I find that in *Juba* all examples have it; in *Colorado*, *Manitoba*, *Nevada* and *Idaho*, most do not have it, but some of each sex in each form do. It is often reduced to a mere point which is confluent with the spot in cellule 6. It scarcely does more in this case than cross the nervule, and does not merit being called a spot.

Considering the lack of this spot in *Columbia*, the peculiar shape of the band of spots, the color of under surface, and the unspotted fringe, and the differences in color and marking between the sexes, I must regard this as a distinct species from *Comma*, as in fact, at a considerable distance from *Comma*, and it has differences from the other American forms to entitle it to stand alone. Its peculiarities are important, and, so far as appears, permanent.

5. Besides the three forms of *P. Colorado* is another as distinct as any of them, which comes from California and Nevada. I have 2 males and 2 females taken by Mr. Baron in north California, and 3 females by Mr. Morrison in Nevada. Same size and shape as *Colorado*, bright yellow-fulvous on upper side, the sub-apical spots of primaries placed as in the allied forms, but not so distinct, not well defined. On the under side, the color is grayish-yellow; the spots of both wings scarcely lighter than the ground (not white, therefore, or even light); the band on secondaries slight, and often macular; in one of the Nevada examples it is altogether wanting, except for a dot near outer angle. This form cannot be ranked with any of Mr. Scudder's, and is apparently constant. I call it species *Oregonia*.

7. Dr. Boisduval described a species as *Ruricola*, which has hitherto been unrecognized by American collectors, so far as I am aware. He says: "Size of *Lineola*, the wings a little more sinuous, almost the same yellow, with a narrow brown border; the fore wings having the stigma as pronounced as in *Sylvanus*, marked lengthwise by a fine whitish line. Under side of the wings yellow, with all the surface of secondaries and the apical area of primaries a little more green than in *Sylvanus*. Described after the male only. Ann. Soc. Ent. de Fr., 2 Ser. x. 316, 1852. I have found among Mr. Baron's collections a single male of this species, agreeing in all respects

with Dr. Boisduval's description. The spots of secondaries are pale yellow, very large, making a confluent band. I should place *Oregonia* between this species and the *Comma* group.

I tabulate these species as follows: 1. RURICOLA; 2. OREGONIA; 3. COLUMBIA; 4. COLORADO; 5. COLORADO var. IDAHO; 6. NEVADA; 7. MANITOBA; 8. JUBA; 9. JUBA var. VIRIDIS.

There is a recent description of what is called *PAMPHILA CALIFORNICA* n. sp. Mabilie, Ann. de la Soc. Ent. de Belg. v. 27, p. 68, taken from one male only, and which lacks definiteness. I can find nothing to which it applies. Of the under side, it reads: "the secondaries are ochraceous, and one or two points of a pale yellow color can with difficulty be distinguished among the nervules." So that it cannot be one of this group we have been considering.

NOTES ON THIRPIDÆ, WITH DESCRIPTIONS OF NEW SPECIES.*

BY HERBERT OSBORN, AGRICULTURAL COLLEGE, AMES, IOWA.

The family Thripidæ, though possessing many characters of peculiar interest, and being of no little importance economically, has received but very little attention from American Entomologists, either systematic or economic. With the exception of a few notes upon their habits, and descriptions of some four or five species by Dr. Fitch, and also a few notes by Mr. Walsh and Prof. Riley, concerning their food habits, scarcely anything has been written of our native species.

Without going into a discussion of the classification of the group, or the peculiar characters which seem to ally it to different orders, it will be sufficient here to state that the wings are entirely membranous and folded flat upon the back, which, with the general conformation of the body, would seem to place it with the *Homopterous* division of the *Hemiptera*. The mouth parts, however, are free, composed of both mandibles and maxillæ, and the maxillæ and labium are palpigerous—characters very

* Read before the Iowa Academy of Sciences, Sept. 5, 1882. Since this paper was read, Mr. Theo. Pergande, of Washington, has kindly examined my specimens and corrected some errors which had crept in, on account of my scanty literature on the subject and lack of types.

diverse from those of the group just mentioned. These differences have led some authors to separate the group into a distinct order, the *Thysanoptera*, while others have considered them an aberrant family of *Hemiptera*, others of *Orthoptera*, and still others of *Pseudo-Neuroptera*.

The most obvious characters are the minute size, the species nearly all ranging between one and two millimetres in length, and being very slender; the long narrow wings with broad fringes, folded flat on the back; the 2-jointed tarsi without ungues and terminating in a vesicle, and the beak-like mouth parts pointing backward, but composed of free mandibles and maxillæ, the mandibles being styliform.

The European species have been carefully worked by Mr. Haliday, to whom we are also indebted for the only systematic arrangement of the genera. His synopsis enumerates over forty species, and doubtless our American species are quite as numerous, for without there having been any apparent effort to collect them, a fair beginning has been made upon this number.

Dr. Fitch described four species in his reports on N. Y. Insects, and I understand that his notes contain MS. descriptions of two other species. The former are *Phlæothrips mali*, *P. caryæ*, *Thrips tritici* and *Coleothrips trifasciata*. Prof. Riley mentions a species (6th Rept. Mo. Insects, p. 50) as *Thrips phylloxera* of his MSS. Dr. Packard has described a species infesting onions (New and Inj. Ins. Little Known, 1870), and Prof. Comstock *Limothrips poaphagus* infesting heads of grass. Other descriptions may have been published of which I am not at present aware, and I have collected three species in this State which seem to be undescribed, beside two species which are known.

The *Thripide* frequent the blossoms of various plants, but their presence has been variously interpreted by different authors. In Westwood's "Classification" they are spoken of as feeding upon the plant tissues, and numerous instances are cited of their injuries to vegetation.

Dr. Fitch found his *Phlæothrips mali* gouging into young apples, and his *P. caryæ* in galls on hickory leaves, but doubted their agency in forming the galls. On wheat he states that *T. tritici* injures both blossoms and the growing kernels of wheat. Mr. Walsh held the opinion that Thrips are carnivorous and very beneficial in their attacks upon plant lice and other insects, and argues that they are found in blossoms and on other parts of plants simply in search of their prey. Prof. Riley describes the habits of his *Thrips phylloxera* as attacking the Grape Phylloxera.

If these observers have been correct in interpreting what they saw, we must admit that different species of the group possess different food habits, a point which should be admitted only on the strictest testimony, for while instances do occur where certain species in a distinct group differ in habits from the others, it is of rare occurrence—a fact more fully appreciated when we consider the intimate relations between structure, whereby groups are defined, and habit, these having naturally a mutual correspondence, whether we consider the habit necessitated by the structure or the structure a result of progenitary habit.

So far as the anatomy is concerned, it seems to me much in favor of a vegetable diet. Carnivorous insects as a rule are furnished with strong mouth parts, and are able to thrust them forward from the head, even if their normal position is otherwise. In *Thripidae* the mandibles are slender, styliform, and apparently weak and poorly adapted to the capture of prey, and the mouth parts pass backward under the prothorax. Owing to the minuteness of the insects positive observations upon their methods of feeding are difficult. I have watched them with a lens, and noticed that they thrust the mouth parts down upon the surface of a petal or other portion of the blossom, much as a fly does in sucking up sweets, but have never been able to see them actually puncture the tissue. I have noticed them in apple blossoms, however, where the petals were unopened and no other insects were present, and in these blossoms 80 per cent. were injured by punctures upon the styles and other parts, but particularly the styles, and all the evidence pointed to the Thrips as the cause of injury. Should the observations of other entomologists prove this to be a general habit, it has great economic importance, and shows that insects may have a far different influence than *assisting* in fertilization of plants, which we have come to consider as one of their benefactions, for whereas much has been written concerning the fertilization of plants by insects, comparatively little has been written upon the prevention of fertilization which they may cause.

Although I have observed Thrips in many situations beside the blossoms of apple, cherry and plum, as well as in blossoms of catalpa, asparagus, clover, potato, timothy grass, and a number of ornamental plants, I have never found evidence of their attacking insects. At one time I found a single individual near a colony of *Aphis maidis*, but nothing to indicate that it was attacking the lice.

The observations of Walsh and Riley must certainly be considered

conclusive for the species they noticed, but I cannot think they will hold for the group, but rather that they are departures from a normal habit, the Thrips in those cases finding the soft-bodied, sluggish plant lice preferable to the plant tissues lying beneath them,—the habits of the plant lice making it less necessary for the predaceous insect to be specially adapted to seizing and retaining them. Indeed, may it not be that they seek rather the juicy exudation from the bodies of these insects than to destroy them?

PHLEOTHrips NIGRA, n. sp.

Length 1.75–1.80 m.m. Width .37 m.m.

Black, distal portion of anterior tibiae, proximal joint of all tarsi and joints 3 with base of 4, sometimes 3–5, of antennae, yellowish. Head from above quadrangular, longer than broad, front convex with lateral angles obtusely rounded. Antennae sub-approximate, third joint yellowish and the two following ones more or less pale, especially at base; joints nearly equal, 8th short and small, sparsely set with hairs. Prothorax short, broad, lateral borders converging toward the head; meso and meta-thorax together as long as broad, converging slightly toward the abdomen; abdomen tapering, caudal segments sparsely fringed with hairs; tube fringed at end. Anterior legs larger than the others, with tibiae and tarsi yellowish, set with a few very minute hairs; posterior tibiae with spines at the distal extremity.

Wings without veins, perfectly membranous, no minute hairs on the surfaces; anterior pair with a row of three spines near the costal border at the base; fringe at base wanting; very long on both borders and at apical portion of posterior border composed of two rows, the additional one of finer ciliae.

Differs but slightly from *P. mali* Fitch, that species being purple-black, joint three of antennae white and the tibiae and tarsi not yellow. Possibly this may prove only a variable form. Collected from heads of red clover. Ames, Iowa.

CHIROTThrips ANTENNATUS, n. sp.

Length 1.10 m.m. Width .25 m.m.

Black, except joint 3 of antennae, which is paler.

Head small, narrowed in front, and here entirely occupied by the bases of the large peculiar 8-jointed antennae, the basal joints of which are very broad, short and inserted in large concavities of the front; joint 2 is large, irregularly trapezoidal, with the acute angle outward; joints 3

and 4 irregular, ovate, with an elongated papilla extending from the outer anterior portion; joints 5 and 6 slightly smaller, 7 and 8 minute; in some cases traces of a ninth joint can be seen; joints 5-8 are more hairy than the others: 3-6 dilated; ocelli placed far back on the vertex; prothorax converging rapidly to the anterior border, where it is equal in width to the occiput, broader at posterior border than long; a few spines at posterior angles. In front of mesothorax, forming a girdle, is a narrow thickened portion, which at the sides, with an amplification of 150 diameters, is seen to be thickly set with very short pointed spurs; mesothorax short and broad; metathorax slightly narrower; legs nearly equal, anterior ones a little more robust and with few scattered hairs, intermediate and posterior ones more hairy and with tibiae on distal portion, and the tarsi, spiny. Wings slender, sword-shaped, anterior pair smoky, with two longitudinal veins, costal fringe not more than half as long as inner, beginning near the base with strong spines, a few spines situated on the veins; posterior wings hyaline, a thickened line (vein?) along the middle. Both wings with minute short hairs scattered over the membrane; abdomen tapers suddenly after seventh segment, a few hairs on anterior segments, becoming longer and more numerous caudad.

Collected at Manchester, Delaware Co., Iowa, where it was very abundant in heads of timothy grass. July 10th, 12th, 1882.

THRIPS STRIATA, n. sp.

Female. Length 1.15 m.m. Width .25 m.m. Whitish with yellow and blackish markings.

Head rounded in front, appears marked with transverse striae and dusky border posteriorly; antennae approximate, whitish at base, gradually becoming more dusky toward the apex, where they are nearly black. Eyes large; ocelli near together and well up on vertex. Thorax with elongated dusky patches forming a broken subdorsal stripe each side; on the prothorax these extend latero-cephalad and are broken into spots; abdominal segments 1-6 are dusky on tergum, except at the sides, seventh has dusky spot in centre, apex slightly dusky and surrounded with black spines; thorax and abdomen tinged with yellow at the sides. Hairs scarce and fine, except at end of abdomen. Legs concolorous with body, with dusky patches on dorsal aspect of femora and tibiae, sparsely set with fine hairs. Wings unmarked, fringe and spines wanting at base of costal border, no discal spines; both wings covered with very minute hairs.

I do not know what is the food plant of this species, the only specimen I have being caught on the leaf of a book I was reading in the Zoological Laboratory (fourth floor of building). It probably flew in at an open window. Taken Aug. 11, 1882.

THRIPS TRITICI Fitch. Trans. N. Y. Ag. Soc. for 1855, page 540.

Male, length .75-.80 m.m.; width .20 m.m. Female, length 1.10-1.20 m.m.; width .25 m.m.

Color yellow, thorax tinted with orange; antennæ with dusky annulations.

Head from above nearly square, eyes occupying anterior angles. Antennæ approximate at base, joint 2, apical half of 4, and 6, dusky; joints 3 and 5 dusky at apex, the antennæ appearing annulated under low power of microscope. Head, thorax and abdomen with few stiff hairs. Legs concolorous with body, all the tibiæ with two spines at distal end, distal joint of tarsi a little dusky, proximal joint of hind tarsi with two spines. Wings narrow, hyaline, fringes whitish; anterior wings have costal fringe of shorter ciliæ than posterior ones, and the ciliæ are intermixed with shorter, stiffer, spiny hairs, which at base replace the fringe; two rows of blackish spines on upper surface of wing corresponding to subcostal and median veins. Posterior wings with no discal spines; ciliæ of anterior edge shorter and more spiny than those of posterior. Both wings have numerous rows of very minute hairs on the surface. The males are shorter and smaller than females, with wings reaching beyond the tip of the abdomen instead of nearly to it, and there are some strong spines near the tip of the abdomen.

This species is the one most abundant in this locality, and the one upon which most of my observations have been made. Dr. Fitch speaks of the antennæ as widely separated at base, and his figure (a very poor one) makes them particularly so, which led me to think I had a distinct species; but Mr. Pergande has kindly compared my specimens with the type and pronounces them identical.

HACKBERRY PSYLLID GALLS.

BY PROF. C. V. RILEY.

In reply to the questions raised by the Rev. Thomas W. Fyles on p. 84 of the May number, permit me to say :

1. That to speak of "THE parasite of *Phylloxera vastatrix* and THE gall insect of the nettle tree," as he does in the heading to his communication, is inaccurate, since there are many of each.

2. Besides a number of Cecidomyid galls on *Celtis*, I am acquainted with more than a dozen Psyllid galls upon the plant. The insects producing these galls mostly belong to a new genus which, in a paper that I have prepared on the Psyllidæ of the U.S., is called *Pachypsylla*. It belongs near *Diaphorina* Loew and *Calophya* Loew, and is characterized by the short, stout antennæ, short, obtuse frontal cones, convex back, vertical rugoso-punctate head and pronotum, and by the wings being parchment-like, twice as long as wide, and having the marginal cells very long and sub-equal. Only two of these have been referred to by name in print (not properly described) so as to be recognizable, chiefly through their galls, viz. :

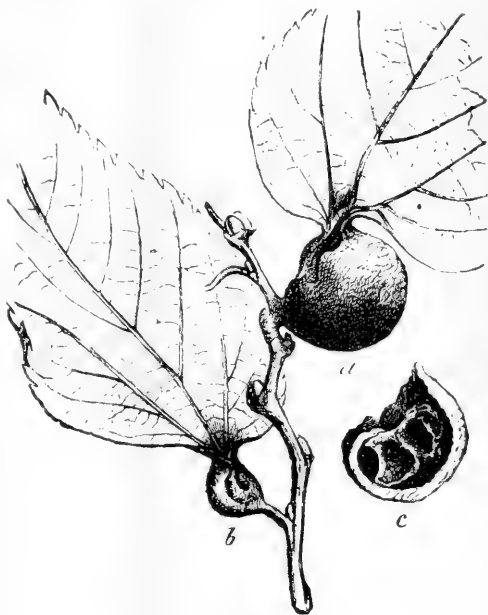


Fig. 6.

GALL OF *PACHYPHYLLA C-VENUSTA*.—a, gall fully formed; b, do., forming; c, do., in section. (After Riley.)

Psylla venusta O. S. (Stettiner Ent. Zeit. 1861, p. 422) and *P. celtidis-mamma* Riley (Johnson's Un. Cyclopædia, 1876, article Gall-insects), *P. celtidis-grandis* Riley of the same article being synonymous with *venusta*. The first-mentioned is a very large insect producing a large swelling of the

petiole, or of the base of the leaf, open on one side and so well described by Osten Sacken, in the article above cited, that Dr. Hagen should have seen that it could not apply to Mr. Fyles's description of his gall (p. 198, vol. xiv) which applies very well to *c-mamma*, though one-half inch is

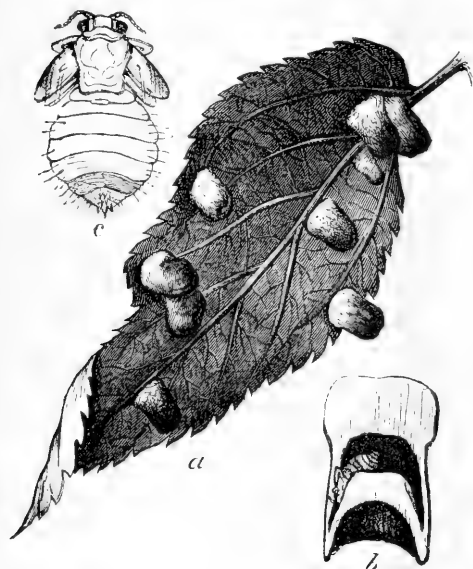


Fig. 7.

GALL OF *PACHYPTILIA C-MAMMA*.—*a*, leaf with galls from under side; *b*, section of gall showing cup-like depression, and insect in cavity; *c*, pupa—*b*, *c*, enlarged. (After Kiley.)

rather more than its average length. That said description does not apply to *venusta*, there can be, however, no doubt whatever. From a single specimen of the insect sent me by Mr. Fyles, my determination was confirmed. *P. c-mamma* so closely resembles another species (*P. c-cucurbita* M.S. mihi), however, that without the galls it would be difficult, if not impossible, to separate them—a not uncommon occurrence among gall-making species. It was because of this fact that I expressed, in a letter to Mr. Fyles (Feb. 24th), a qualified opinion, urging him to send specimens of the galls, which he failed to do.

His description of said gall can apply only to *c-mamma*, which is, moreover, the most common of the many galls upon the leaf; and, like all the other species on the leaf, is closed and not open as in *c-venusta*. The accompanying figures, which I have had on hand for many years, will at once show the difference between the galls *celtidis-venusta* and *celtidis-mamma*.

In reference to the genitive of *Celtis*, the best botanical works cite the term as of Greek origin—*Græca obscura*, as Linnæus puts it. Hence the genitive *celtidis* which, Latinized, becomes *celtidis*. See also *Celtideæ* Endlicher; *celtidifolium* DeCandolle. I am not surprised at Mr. Fyles's question, however, as some fifteen years since I was inclined to use the genitive *celtis*, which would, also, be justifiable. Prof. G. I. Goodale has

been kind enough to send me, through Dr. Hagen, the following from Wittstein: "Celtis L. Celtis nach Plinius (eine der Lotus arten) von Greek "*Kellein*" (antreiben), Greek "*Keltis*" (Peitsche). Die zweige dienen zu Peitschen stielen." The reference to my "infallibility" is beside the question.

GENERAL INDEX OF THE THIRTEEN ANNUAL REPORTS OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

This useful work, covering the period from 1870 to 1882 inclusive, has recently been issued. The compiler, E. Baynes Reed, Esq., Secretary-Treasurer of the Society, has spared no pains or labor in making the index complete in every particular. It is uniform in size with the Reports, and covers 35 pages. Beginning with a summary of the illustrations used and of the orders illustrated, there follows a detailed list of all the figures used in each of the thirteen Reports. The second part consists of a classified list of the insects illustrated, while the third part is a general index which is very full and complete, and will be of much value to all who may have occasion to consult its pages. A copy will be mailed to each member of the Society.

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The Annual Meeting will be held at the rooms of the Society, Victoria Hall, Clarence St., London, on the evening of Wednesday, October 3rd, at 8 o'clock. It is hoped that a large number of members will be present. Any one having papers to present will please communicate with the Secretary, who will arrange for the reading of communications sent by absent members.

CORRESPONDENCE.

TRYPETA CERASI, L.

A black cherry tree imported from Gilgenau, Eastern Prussia, in 1873, had first fruit in 1881. I did not find larvæ in the cherries in the last two years. In 1883 the fruit was smaller than usual, perhaps because they were very abundant; larvae and pupae are very common in the fruit. I do not find this species in Loew's Monograph, nor in O. Sacken's Cata-

logue. In Loew's *Trypetine* (in fol.) p. 45, it is *Rhagoletis cerasi*; in Schiner, *Herina frondescencie*, L.

The larva and pupa are not different from those of *Trypeta* (*Spilographa*) *cerasi*, received by Prof. Rosenhauer from Europe. Of course this can not be an evidence in a family, where all larvae and pupae are so similar one to the other. I will try to raise them, but as Rosen. states in his Monograph that the imago appears eleven months later, we have to wait till June, 1884, for the fly. Nevertheless I like to draw attention to the fact. Loew states that the larva lives in cherries, in *Lonicera xylosteum* and other *Lonicerae*, and in *Berberis vulgaris*, after Frauenfeld. Rosenhauer found it in *Lonicera tartarica*, and this shrub is also present in my garden for 13 years, always much eaten by a Tenthrid larva, but not as far as I know, by a *Trypeta*. I do not find mentioned any larva in the fruit of the cherry in the American literature.

Cambridge, Mass., July 29, 1883.

DR. H. A. HAGEN.

Dear Sir: I enclose some beetles sent me from a house at Cold Spring, on the Hudson River, New York. I am unable to answer the question put to me as to what they are. My friend says: "The house here is full of them; we kill them by thousands with insect powder. They are found behind the paper on engravings and everywhere, thousands being under the carpets, but the carpets are not cut." My only excuse for troubling you is as a subscriber of some years to your excellent ENTOMOLOGIST.

G. H. VAN WAGENEN.

Rye, Westchester Co., New York.

[The insects have been submitted to Dr. G. H. Horn, of Philadelphia, for determination, who says they are specimens of *Galeruca xanthomelane*.—ED. C. E.]

PLANOSA LARICIS.

Last season I found four cocoons of this interesting species on the white pine, and this season twelve more were found. The females agree well in color with that figured by Dr. Fitch, but the males are much darker. Some of them are wholly black, except a few long, white hairs on the sides of the thorax. I am not aware that this species has been found on pine before.

ROBERT BUNKER.

The Canadian Entomologist.

VOL. XV. LONDON, ONT., SEPTEMBER, 1883.

No. 9

THE TOWN AND THE FIELD—WITH SOME ACCOUNT OF THE COCOONS OF PARASITES.

BY FREDERICK CLARKSON, WALL STREET, NEW YORK CITY.

Here I am again imprisoned within the walls of the town, after enjoying all the liberty of the field. How unphilosophical and dissatisfying to a devotee at the shrine of Nature are the labors that attach to a locality like this! One must turn over a new leaf occasionally. To balance the ledger, even though it have golden results, is comparably but as the dust of the balance. The City is stupid, hot, and odoriferous—empty, and yet full. Wealth, with its polished exterior, has long since departed, and “poverty, a wrinkle of itself,” remains. The intensity of the heat brings the hidden life without, and the town is seemingly the more full. What a wretched place in midsummer is a great City! Ho! for the country, where the God of Day is awaked by

“The breezy call of incense breathing morn,

* * * * *
The cock’s shrill clarion and the echoing horn.”

And when he sinks to rest behind the everlasting hills, mark

* * * * *
“How still the evening is,
As hushed on purpose to grace harmony.”

While from every thicket, from tree top, and from meadow—Nature’s most glorious cathedral—comes forth the vesper sacrifice of song. The trees, like columns, reach up to the heavens, and canopied over all, the gorgeous beauty of a passing summer day. These are some of the inspirations that overtake a fellow who is ready to pack up and start.

Meanwhile, as a pleasing abstraction from my surroundings, I write for your journal a brief account of the cocoons of parasites. Much has been written concerning the transformation and habits of the parasitic Hymenoptera. Supposing it may be of interest, I give a few notes relating to the cocoons, and such other methods as these parasites adopt for a covering while in the pupa condition. The circumstance that a portion of my labor during the past season did not result as expected—many

of the caterpillars which I had fed up from the third and last moults developing into these parasites—gave me the opportunity of examining the mechanical skill of these insects and of noting some peculiarities of habit. From the cocoon of *T. Polyphemus* I have obtained *O. Macrum* Linn. This parasite forms a very tough oval-shaped cocoon, occupying the larger portion of the cocoon of the moth. It is composed of very fine silk agglutinated by a dark secretion. The exterior is of a dark brown color, with a faint yellowish or golden band around the centre; the interior is lined with a thin transparent substance, possessing a brilliant metallic polish. Distinguished Entomologists have asserted that this parasite commonly deposits from eight to ten eggs on the *Polyphemus* caterpillar. I cannot reconcile this statement with the observations that I have made. Out of three cocoons of the *Polyphemus* caterpillar, I have in each case obtained but one of the parasite; indeed there is not sufficient space within the cocoon of the moth for more than two cocoons of the parasite. It is possible that some of the parasitic larvæ may escape from the cocoon of the moth, and undergo transformation without, yet in such cases as came under my observation no such evidence existed. From the chrysalid of *P. Troilus* I have obtained *T. Exesorius* Brullé, which transforms without other covering to serve as a cocoon beyond that supplied by the chrysalid. I note that the point of exit of this parasite from the chrysalid was the same in every case, viz., on the right or left side, about midway of the thorax, at the widest part. From a cocoon of *P. Cecropia* I am furnished with eight cocoons of *B. Flavator* Fabr. They are three quarters of an inch long, and very narrow. The outer covering is of loose silk; within it is rendered more dense, the threads being drawn together by a gummy secretion. They are grouped, side by side, lengthwise within the cocoon of the moth. I would state in this connection that one of my *Cecropia* cocoons contained a number of parasitic larvæ, apparently half fed, starved out, dry and hard. I make this note in view of the remarkable instinct that governs this family in commonly providing the necessary food for its progeny. The insufficiency in this case is possibly accounted for in that the caterpillar may not have been full fed at the time of spinning its cocoon, and that the parasite, with an instinct as to quality, but not quantity of food, and following the habit of many generations, makes a deposit of ova in correspondence with the ordinary size or common growth of the caterpillar. The pupa of *P. Achemon* gives me twelve cocoons of *Perilampus*; they are of a dark brown color, about a

quarter of an inch long, oval in shape, and were found in the earth close by the nearly consumed pupa of the Sphinx. From a cocoon of *S. Virginica* I have obtained those of a parasite, probably a *Chalcis*, the insects having escaped through an aperture in the jar in which I had placed the cocoons. They are about a quarter of an inch long, of a bright red color, and are attached to the outer surface of the cocoon of the moth. Judging from what has transpired among my collection of larvæ made at Oak Hill, New York, the past summer, I am led to believe that the parasitic visitation to that locality must have been numerous, promising to the agriculturist rather than to the entomologist a better reward for the industry of the present season.

A NEW CATOCALA.

BY G. H. FRENCH, CARBONDALE, ILL.

CATOCALA SARA, n. sp.

Expanse 3.10 inches. A form in size and general appearance resembling *C. Aspasia*, Streck., but having much darker colored fore wings, besides other points of difference. Primaries blackish gray from the base to the t. a. line, along the posterior margin to the subterminal line, and from this in a broad band to the costa, the inner part of this band running along the inner side of the reniform. This color is formed of a black or brownish black ground, sprinkled with white scales. This leaves a pale space between the stigmata from the median vein to the costa, and the whole end of the wing beyond the dark space spoken of. T. a. line indistinct, of the ground color, but with less white scales; t. p. line distinct anteriorly, one large and one small tooth opposite the reniform. Subterminal space scarcely tinged with brown, the subterminal line white with a sprinkling of black scales. Orbicular indistinct, black with a few white scales, reniform with a few white scales and an annulus of gray. Terminal space gray. Secondaries rosy red, the median band very much as in the form *Walshii*, not reaching the inner margin, a little constricted opposite the disc, beyond this a little enlarged, after which it narrows to less than half the costal width. Terminal line like *Walshii*, with an internal excavation before the anal angle that reaches half through the band. In *Aspasia* this excavation extends almost or quite through the band. Terminal fringe white, internal gray with a few blackish hairs at the base of

the wing. On the under side, the basal and medial band of the primaries are connected by a broad posterior band of black. Described from two specimens from Jamestown, Colorado, one in my own cabinet and one in the cabinet of Herman Strecker, Reading, Pa., the latter being a little lighter than the one in my cabinet.

LIST OF GEOMETRIDÆ TAKEN AT QUEBEC AND MONTREAL.

BY G. J. BOWLES, MONTREAL.

In order to make the following list as complete as possible, I have included the species in the cabinets of Messrs. H. H. Lyman and F. B. Caulfield, of Montreal, with those in my own collection, taken at Quebec, and also those credited to Mr. Belanger, of Quebec, in Packard's "Monograph." When a species is found both at Quebec and Montreal, no locality is given; when found only at either place, Quebec is indicated by a "Q," Montreal by an "M." The list comprises 115 species and 3 varieties. The names and arrangement are those of Packard's "Monograph."

Eupithecia.

albicapitata, Q.

absynthiata.

miserulata, M.

Glaucopteryx.

caesiata, Q.

magnoliata.

Plemyria.

multiferata.

Epirrita.

cambricaria.

perlineata, Q.

dilutata, Q.

Hydriomena.

trifasciata.

californiata, Q.

Petrophora (Cidaria).

truncata, Q.

albolineata, Q.

Petrophora (Cidaria).

diversilineata.

hersiliata, M.

Ochyria.

ferrugata.

also var. *unidentaria*, black

northern variety.

designata.

Rheumaptera (Melanippe, &c.).

ruficillata.

lacustrata, M.

unangulata, Q.

intermediata, M.

lugubrata, Q.

hastata, very common and variable.

Anticlea.

vasiliata.

- Hydria.
 undulata.
 Phibalapteryx.
 latirupta, Q.
 intestinata, M.
 Triphosa.
 dubitata.
 Lobophora.
 montanata.
 viridata, M.
 vernata.
 geminata.
 Odezia.
 albovittata.
 Heterophelps.
 triguttata, M.
 Zerene.
 catenaria, M.
 Haematopis.
 grataria, M. [Is not this the
 Pellonia successaria of Walk.,
 described in Can. Nat. vol. 5,
 1860, page 262 ?]
 Eufidonia.
 notataria.
 Fidonia.
 truncataria, Q.
 Ematurga.
 Faxonii, Q.
 Caripeta.
 divisaria.
 Lozogramma.
 disconventa.
 detersata.
 defluata. Common
 Eufitchia.
 ribearia. Common.
- Thamnonoma.
 subcessaria, Q.
 brunnearia, Q.
 Marmopteryx.
 strigularia, M.
 Phasiane.
 mellistrigata, M.
 Semiothisa.
 granitata, M.
 bisignata, M.
 enotata, Q.
 (Some not identified.)
 Corycia.
 vestaliata.
 semiclarata.
 Eudeillinia.
 herminiata, Q.
 Deilinia.
 variolaria.
 erythemaria.
 Gueneria.
 basiata, M.
 Stegania.
 pustularia.
 Callizzia.
 amorata.
 Acidalia.
 rotundopennata, Q.
 nivosata.
 enucleata, M.
 insulsaria, Q.
 Ephyra.
 pendulinaria.
 Dyspteris.
 abortivaria, M.
 Eucrostis.
 chloroleucaria, M.

Nemoria.

- subcroceata, Q.
- var. incertata, Q.
- gratata, Q.

Aplodes.

- rubromarginaria, M.

Anisopteryx.

- vernata.
- autumnata, M.

Hybernia.

- tiliaria.

Amphidasys.

- cognataria.

Biston.

- ursaria.

Tephrosia.

- cognataria, Q.
- anticaria, Q.
- canadaria.
- cribrataria, Q.

Cymatophora.

- crepuscularia.
- pampinaria, Q.
- humaria.
- larvaria.

divisaria, Q. Walker. List.
Lep. Het. Br. Mus. XXI,
489, 1860. [Not figured by
Packard, but stated by him
to be "apparently a valid
species," and placed among
his "Desiderata." Compared
by me with Walker's type in
Coll. Ent. Soc. of Ontario,
and found to be identical.]

Hemerophila.

- unitaria, M.

Cleora.

- pulchraria.

Hyperetis.

- nyssaria.

Plagodis.

- phlogosaria, M.
- Keutzingaria, Q.
- alcoolaria, M.

Nematocampa.

- filamentaria.

Angerona.

- crocataria, Common.

Sicya.

- macularia.

Metrocampa.

- perlata.

Therina.

- fervidaria, M.
- endropiaria, M.
- seminudaria, M.

Epirranthis.

- obfirmaria, Q.

Endropia.

- duaria, M.
- hypochraria.
- marginata, Q.
- armataria.
- bilinearia.
- effectaria, Q.
- obtusaria.
- serrataria, M.

Azelina.

- Hubnerata.

Eugonia.

- alniaria.
- subsignaria, Hub. M.

Caberodes.

- confusaria.

Metanema.

carnaria.

inatomaria.

Tetracis.

lorata.

crocallata.

Tetracis.

Coloradaria? Q.

Eutrapela.

transversata, M.

Also, var. goniata, Q.

clematata.

MONTREAL BRANCH OF THE ENTOMOLOGICAL SOCIETY
OF ONTARIO.

The tenth annual meeting of this Branch was held at the residence of the President, H. H. Lyman, Esq., M. A., Montreal, on Tuesday, 8th May, 1883, at 8 o'clock, p. m.

President read the following report of the operations of the Society for the year :—

REPORT.

Your Council beg to submit the tenth annual report of the Branch.

Five regular meetings have been held during the year, and in addition to these, the members have had the pleasure of attending the annual meeting of the parent Society, which was held in the rooms of the Natural History Society, on the 24th August last, during the session of the American Association for the Advancement of Science. The opportunity of meeting with many of the entomologists of the United States, and the President and other officers of our Canadian Society, was highly appreciated by our members.

The following original papers have contributed to the interest of our meetings during the year :—

1. Description of a Dipterous Parasite on *Phylloxera vastatrix*, by the Rev. T. W. Fyles.

2. Sir John Lubbock on Ants, by G. J. Bowles.

3. Notes on the Genus *Callimorpha*, by H. H. Lyman.

4. Preliminary list of the Geometridae of Quebec and Montreal, by G. J. Bowles.

5. Notes on some Diurnal Lepidoptera occurring in Canada, by F. B. Caulfield.

6. Causes of Rarity in some Species of Insects, by G. J. Bowles.

The whole respectfully submitted.

H. H. LYMAN, President.

The report having been adopted, the election of officers took place, with the following result :—

G. J. Bowles, President ; W. Couper, Vice-President ; F. B. Caulfield, Secretary-Treasurer ; J. G. Jack, H. H. Lyman, W. Shaw, H. Graves, Council.

A very pleasant hour was then spent in examining the President's collection of Lepidoptera, and the scarce and valuable illustrated entomological works in his library.

GEO. JNO. BOWLES, Secretary.

ORGYIA LEUCOSTIGMA, SMITH.

BY FREDERICK CLARKSON, NEW YORK CITY.

The foliage of the trees in this city is undergoing spoliation by the larvæ of this moth. Many of the trees are entirely denuded of their leaves, particularly the Silver-leaf Poplar, the Ailanthus alone escaping attack. The writer suggested to the authorities last spring that hand-picking of such cocoons as contained the deposit of ova was the only sure way of exterminating these insects. Had such service been rendered the trees at that time, this damaging visitation would have been prevented. There is good reason to believe, however, that what the authorities have failed to do, a young army of parasites, "*Pimpla*," which have put in an appearance during the last fortnight, are now actively attempting, and we shall probably be rid of this moth another year. The ova commenced to hatch out about the 25th of May, and the larvæ began to assume the pupa form about the 21st of June ; ten days thereafter the imago was discovered depositing ova. Out of twelve cocoons gathered on the 15th of July, four yielded the parasite already referred to. I would note here in connection with this parasite a circumstance very commonly observed among the Lepidoptera. I discovered two ♂ parasites upon a cocoon containing the pupa of this moth. I drove them away several times, but they as frequently returned. I finally captured them, and placed them together with the cocoon in my collecting bottle. Before I had returned to my residence a ♀ *Pimpla* had emerged from the cocoon and was busily employed in expanding her wings. I also noticed that this parasite deposits its ova

through the cocoon on to the pupa, and that in every case that came under my observation the pupa selected was the ♀, doubtless from the fact that its plump condition provides the necessary food for the development of the parasite, which the ♂ pupa of the moth could not furnish.

MEETING OF THE ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCE- MENT OF SCIENCE.

A meeting of entomologists was held, according to announcement, on the 15th of August, 1883, at Minneapolis, Minn., in the University Buildings. There were present during the meetings the following: Prof. S. A. Forbes, Normal, Illinois; Prof. C. V. Riley, Washington; D. S. Kellicott, Buffalo; Herbert Osborn, Ames, Iowa; O. S. Westcott, Chicago; Wm. Saunders, London, Ontario; Dr. and Jenny Hoy, Racine, Wisconsin; C. L. Herrick, E. W. Claypole, Prof. E. S. Morse, C. E. Bessey, E. H. Canfield; Miss Mary E. Murtfeldt, Kirkwood, Mo.; Mrs. M. B. Moody, Buffalo, N. Y.; Thomas S. Roberts, Minneapolis, Minn., and others.

S. A. Forbes read a letter from J. A. Lintner, regretting his inability to be present, and after some remarks by Mr. C. V. Riley as to the prevailing sentiment at the meeting of entomologists last year at Montreal, it was decided to reorganize the Entomological Club of the A. A. A. S., under the rules as hereinbefore recorded.

On motion, the following officers for the ensuing year were then elected:—

President, D. S. KELLICOTT.

Vice-President, HERBERT OSBORN.

Secretary, O. S. WESTCOTT.

A communication was read from Mr. W. H. Edwards, of Coalburgh, W. Va., giving interesting recent experience in the rearing of butterflies of the following species: *Papilio rutulus*, *P. zolicaon*, *Colias barbara*, *C. amorphæ*, *Melitæa chalcædon*, *M. phæton*, *Lycena melissa*, *Parnassius smintheus*? and *Argynnis coronis*? The author stated that he had bred *rutulus* and *zolicaon* from the egg, that *rutulus* is constantly distinguishable from *turnus*, at least after the first larval stage; and that *zolicaon* is closer to *asterias* than to *machaon*. He had also reared from the egg *Colias amorphæ*, and was inclined to the opinion that it was

distinct from *C. eurydice*. Opportunities had been afforded of studying all stages of *M. chalcodon*, with *M. phaeton* colonizing on the same plant, so that the habits of the two species could be compared.

Mr. Edwards has also raised *Lycaena melissa* from egg to chrysalis, and finds that the larva in the last stages has similar organs to those of *Pseudargiolus* on the 10th and 11th segments, and that ants are attracted in the same way by the sweet fluid they exude. Over 100 eggs of *Parnassius*, either *smintheus* or something close to it, have been obtained from West Montana. As to butterflies, the author stated that he had never seen them scarcer than during the past year. An interesting discussion followed this paper, in which several members took part.

Prof. Riley offered some "Notes on *Pædisca Scudderiana*," and exhibited plants of *Solidago* containing the larvæ of this species, and made some remarks on its habits which went to reconcile the published conclusions and differences between himself and Dr. Kellicott, and to show that while the insect is commonly a gall maker, it was also, exceptionally, an inquiline. The specimens showed that the habits of the insect were variable, and that the larva was either a leaf-crumpler, living in a bunch of curled terminal leaves held together by a silken gallery, a stem-borer, without causing any swelling, or the maker of a more or less perfect gall. He had also found it as an inquiline in the gall of *Gelechia galle-solidaginis*, the gall of which was always distinguishable from that of the *Pædisca*; among other things by the burrow of the larva always being traceable from the blighted tip of the plant, whereas the *Pædisca* larva lived at first in the tip, and when making a gall always left the tip and bored in at the side. Mr. Kellicott's observations were accurate so far as they went, but did not take into account the variation in habit. Mr. Riley had watched these larval habits during the present year from the time of hatching, and had concluded that the insect combined, in varying degree, the four characteristics of gall-maker, leaf-crumpler, stem-borer and inquiline. The larva living in the crumpled leaves later in the season had not been reared to the imago, but he had made comparisons of the young larvæ and found that they were exactly alike, but they showed considerable modification as they developed, especially after the last moult. Several other micro-lepidopterous larvæ bored in the stems and lived among the leaves of *Solidago*; while another species, yet unbred, made a gall similar to that of *Pædisca*; but all the other larvæ known to him were easily distinguished from *Pædisca*.

Mr. D. S. Kellicott said he felt sure that his observations as reported in the paper referred to were correct, and he was glad to know that both his own conclusions and those of Mr. Riley could be thus harmonized. It would seem he had not carried his observations far enough to discover that all the larvæ of *Scudderiana* fed at first in the terminal leaves. Late in the fall he had often taken from the terminal leaves the mature larvæ referred to by Mr. Riley, but had so far failed to obtain the imago from them. He had some doubt still of its being identical with *P. Scudderiana*.

Prof. Riley also called attention to the life habits of *Helia americanalis*, which he finds in the larval state to feed in the nests of *Formica rufa*. So far as he knows, this is the first Lepidopterous insect known to develop in ants' nests. He also gave his experience in rearing *Arsame obliquata* during the past two years, and exhibited specimens in different stages of development. The eggs are laid in curious broadly conical or plano-convex masses enveloped in hair, and a cream colored mucous secretion, which combined look much like spun silk on the inside, and on the outside like the glazed exudation of *Orgyia leucostigma*. The larva, which is pale at first, but dark in its later stages, bores into the stems of *Sagittaria* and *Nelumbium*, and is semi-aquatic, the last pair of spiracles being exceptionally large and dorsal. There are two annual broods, the second hibernating as larvæ in moss and decaying stumps near the water. The moth shows great variation and the summer brood is on the average not much more than half as large as the spring or hibernated generation, and generally much paler.

Mr. D. S. Kellicott said that he had bred this moth at Buffalo, N. Y., where it was very abundant, and he had found it associated with another species, an account of which he promised to give at some future session.

The meeting then adjourned to meet at 2 p. m. the following day.

Wednesday, August 15th, 1883.

The members of the Club met at 2 p. m., the President in the chair.

A paper was presented by Prof. S. A. Forbes entitled "Memoranda with regard to the contagious diseases of caterpillars and the possibility of using the virus of the same for economic purposes." The writer had adopted the results of Pasteur's discoveries in relation to the disease affecting silk-worms as the foundation for his researches. M. Pasteur some time since demonstrated the constant presence of a parasite in the intestines of silk-worms affected by this disease, which has at times threatened the silk industry in Europe. This parasite was not only the

indispensable accompaniment of the disease, but is its originating cause and the means by which it can be and is conveyed to other individuals of the species.

By placing healthy silk-worms in contact with those suffering from the disease, by sprinkling them with the dust of excreta derived from the latter, or by moistening their food with an infusion of the fermented mulberry leaves upon which these had fed, he proved the possibility of conveying the disease from one subject to another.

In pursuance of this, Prof. Forbes has witnessed instances of epidemic disease in different species of insects, as for instance in the Chinch Bug and the Yellow-necked Caterpillar, which disease was invariably dependent upon some form of bacteria or micrococcus, possible of cultivation and reproduction, and by means of which the disease can be indefinitely conveyed. These facts give rise to the suggestion that the specific micrococcus or bacteria causative of these fatal diseases may be used for the infection and destruction of insect pests.

Prof. Osborn called attention to the fact that he had noticed *Bombus pennsylvanicus* inhabiting a deserted wren's nest, situated under the roof of a porch, and at least twelve feet from the ground, it being the first instance he was aware of where they nested away from the surface of the ground.

Mr. D. S. Kellicott had noticed the same or some allied species of *Bombus* inhabiting a mouse's nest in the brace of a barn.

Miss Murtfeldt had also seen them domiciled in a martin's nest.

Dr. Hoy presented for inspection the larvæ, pupæ and imagines of *Plusiodonta compressipalpis*. He had watched the insect through its transformations and had noted that during its early larval stages its prevailing color was a pea green varied with uniformly placed black spots, which increased in number with each successive moult. Only during the last stage of its larval life was the insect usually noticeable by other than professional eyes; since then its color was reddish brown ornamented with creamy white. *Menispermum Canadense* was its usual food plant. The cocoon was formed by first building two nearly parallel walls and then uniting them at the top. Some larvæ which had been displaced after beginning to pupate, had apparently become exhausted, or their teeth had become loosened in anticipation of their approaching new condition, and they were willing to accept bits of paper held to them on a pin, with which they finished the cocoons already begun. The species in Racine cannot be more than two-brooded. The larvæ are not distinguishable

from those of Geometrid moths, as they are true loopers. Their transformations in some particulars were exceedingly prompt.

Prof. Riley stated that he had known certain moths, notably *Leucania unipuncta*, to go through their entire transformations in fourteen days, and in some instances in only ten days.

Prof. Herrick made enquiry as to what are sometimes known as frost-flies.

Mr. Kellicott called attention to a monograph by T. Rymer Jones and one by E. Ray Lankester, to be found in the Quarterly Journal of Microscopical Science, and stated that the species common at Buffalo was *Corethra plumicornis*.

Prof. Forbes had noticed the larvæ of *Corethra* abundant in the stomachs of fishes.

Adjourned to meet at the call of the President.

Friday, August 17th, 1883.

The Club met at the call of the President at 2 p. m., in the room in the University assigned to the use of Section F.

Prof. Osborn presented a paper on the Phytoptera, a group of insects formerly regarded as the larvæ of mites, the individuals of which are so small as to be invisible to the unaided eye. Reference was made to one form found on the soft maple, which occurs as a small swelling on the upper surface of the leaves, containing sometimes a number of these insects, at other times only two or three. One species affects the ash, occurring on both the upper and lower sides of the leaves, one on elm and one on box elder, that on the last named tree having a woolly structure beneath the surface. This paper was illustrated by a very interesting series of carefully mounted microscopic specimens.

Prof. Riley remarked that the species which occur in Europe had been well worked up there, and that in studying our species the work already done on this group should be carefully examined so as to avoid the making of synonyms. He considered that the hibernating habits of these mites was one of the most interesting discoveries which had been made in reference to them, and he hoped that the attention of investigators would be especially turned to this point. He referred also to additional species which occur on the plum, cherry and linden.

Mr. Osborn said that the Phytoptis on plum was not common in the

neighborhood of Ames, although he had found it occasionally ; that on the maple is particularly abundant.

Mr. Saunders referred to the unusual amount of black knot seen in Ontario this year, especially on the common red cherry trees, and stated that he had scarcely seen a specimen of this fungus on the cherry which had not one or more specimens of the plum curculio feeding on the interior.

Mr. Riley remarked that the black knot had been very common of late all through the northern portions of New England.

Mr. Kellicott had observed it as very common in Western New York, and had also noticed that a large proportion contained larvæ.

Mr. Osborn stated that he had observed the larvæ of *Gortyna nitela* boring in young twigs of ash, and had noticed many dead twigs from this cause. He had failed to rear the imago from them on account of parasites ; had also observed the same species feeding externally upon the leaves of the common plantain.

Miss Murtfeldt had found the same insect in twigs of the maple, *Acer dasycarpum*.

Prof. Riley stated that it occurred also in peach twigs and in the stalks of wheat ; also in *Ambrosia artemisifolia*, where it enters from the sides.

Prof. D. S. Kellicott offered the following notes on three lepidopterous stem-borers.

1st, *Arzame obliquata*—Prof. Riley has referred to the habits of this species at a previous session of the Club, and I shall refer only to a few points. As I said yesterday, I feel sure that in Buffalo, N. Y., it is single-brooded. The eggs I have not found, but the recently hatched larvæ I have found feeding upon the flowers about the 12th of June. It occurs in *Typha latifolia*, rarely in *Sparganium*. I have not found it in *Sagittaria* or *Nuphar*. Mr. Riley has referred to the large posterior pair of spiracles placed dorsally. On account of this structure it may remain a long time swimming at the surface. I have had these larvæ confined in a pail of water for five or six hours without apparent injury. When removed from their galleries and dropped into the water, they sink to the bottom and remain there for a considerable time ; then rising to the surface, they swim about with a snake-like motion. In the autumn they leave their food plants and bury themselves in the earth, or crawl into old wood, &c. They pupate in May.

2nd—The second larva is that of a *Nonagria*, which I have called

Nonagria subcarnea. This species is also single-brooded; the larvæ are found boring the stems of *Typha* early in the summer, forming galleries in the stems; it may be readily distinguished from those of *A. obliquata* by the lighter color, often carneous, and by the fact that the last pair of spiracles is not sub-dorsal. I have found it rarely in *Scirpus*. It appears not to be so nearly aquatic, and probably does not pass from one plant to another through the water, or mud. When the time comes for pupation it prepares a pupa-cell above the water line and changes in the bottom of the same, with the head upwards. It leaves the epidermis closing the place of exit, and the freed moth breaks through this with its clypeal spine when it escapes, leaving the pupa skin in the cell. The elongate pupa has a very stout, blunt clypeal spine. The moth appears in August. It is known to abound throughout Western New York, Central Michigan and Eastern Wisconsin.

3rd—The larva of a *Chilo* (?) bores the stems of *Scirpus*. Its habits are similar to those of a *Nonagrian*. It passes the winter in the old stems, and after the new ones appear it bores into them, passes below the water line, and lives low down in the stem. It is mature late in June, when it forms a pupa cell with its place of exit above the water. The pupa breaks up the epidermis left by the larva, covering the place of escape, but does not force its way out before disclosing the moth, in a manner similar to that of the *Ægerians* and others. It is enabled to do this by means of clasps on the abdominal rings, and the sharp or pointed clypeus.

Mr. Riley, in commenting on Dr. Kellicott's communication, said that he had been greatly interested in the facts presented, and especially as to the pupation of the *Nonagria*. As to the difference in the clypeal projection in the two pupæ exhibited, he thought it might be sexual, as in all cases where the clypeus was produced sexual difference occurred, the greatest development being, so far as he had observed, not in the male but in the female. He had recently called attention in the *Naturalist* to the correlation between the produced clypeus and the horny, exsertile ovipositor, and the fact that they indicated *endophytous* larval habit. The various methods of imaginal exit in stem-boring Lepidoptera, and the structural modifications that resulted were most interesting to the philosophical entomologist. In some species, as in the *Nonagrian* here mentioned, the clypeal point on the pupa seemed merely a consequence of the necessary point in the imago, the pupa remaining in its burrow and the imago boring out. In others, as in *Prodoxus decipiens*, the similar

clypeal point on the pupa permitted it to partly bore out of the stem and thus release the imago, which had no homologous point, but an unarmed head. In some borers the larva prepared a little door which the imago easily pushed open, the pupa remaining inactive within its prison; while in others, closely related, the pupa did the work by forcing itself partly out. There could be no question of the digoneutic nature of *Arsame obliquata* at Washington, and none as to its variability as illustrated by his specimens, *vulnifica* and *melanopyga*, being doubtless but forms of it.

Some specimens of *Cantharis Nuttali* were exhibited by Prof. Riley, it being stated that in Dakota they were accused of devouring the growing wheat.

The meeting then adjourned, when the members spent some time in informal conversation and in examining the microscopic specimens illustrating Prof. Osborn's paper.

OBITUARY NOTICES.

PROF. P. C. ZELLER.

The death of this veteran lepidopterist has occurred, long expected and deeply regretted. Seven years younger than the century itself, Prof. Zeller was born on the 9th of April, 1808. Professor in the Prussian Real Schule at Mescritz, he was finally retired on a Government pension, and has lived since 1870 near Stettin, continuing his entomological labors in connection with the Entomological Society of Stettin. Commencing to write at an early age, Prof. Zeller has grown up with the modern science of lepidopterology. His earliest studies were upon the collections of Frau Lienig and the material brought by himself from a southern trip, which extended as far as Sicily. Zeller discovered the curious diurnal *Rhodocera Farinosa*, besides describing certain *Lycaenidae*, but his principal attention was given to the small moths of the families *Pyrallidae* to *Tineidae*, the modern classification of which he may be said to have founded. He first cleared up the confusion as to the genera of *Phycidae*, and by using natural characters, chiefly secondary sexual ones, he succeeded in disentangling our minds with regard to the order of nature in this obscure and neglected field of inquiry. His species and genera are very numerous and almost always valid. It is a misfortune that his valuable monograph on the

Crambidae was issued so nearly simultaneously with the worthless writings of Francis Walker on the same subject, so that some of our North American material has been twice named. The evidence seems to be that Zeller's paper may have been earlier. As a matter of justice it should have priority. In a series of articles, published since retirement from official duties, Prof. Zeller described a number of moths from North America. Rather more than the, unfortunately not to be avoided, proportion of synonyms mark the papers, which are otherwise models of what descriptive work ought to be. Still later, Prof. Zeller has published a beautifully illustrated volume on microlepidoptera, and has given a classification of *Chilo*. As I remember him, in 1867, Prof. Zeller was a white-haired gentleman of very kind manners and enthusiastic for his favorite science. He was moderately thin and tall, wearing a slight whisker, but otherwise with clean shaven mouth and face. His nose was large and well-shapen, his eyes bright and the whole expression of his face pleasing. He had high cheek bones, and his countenance was unmistakably German in its salient features. Loew, the celebrated dipterist, was then living in Meseritz, and an entomological excursion which I made with these two celebrities is among the most pleasant of my European reminiscences. Prof. Zeller's home relations were of the happiest, and the sympathy of an amiable and considerate wife was his through life. And it was a life devoted to science and learning. His accomplishments as a linguist and teacher were well known and appreciated in Germany. We know him chiefly as a biologist, the describer of the exterior structure of lepidoptera. He was fortunate enough to avoid much of the controversial spirit which accompanies descriptive entomology. Although he felt deeply the uselessness of the British Museum Lists and his own studies were impeded thereby, he has, on the whole, little to say in criticism of others. He was not only charitable, but had schooled all natural irritability. His assistance was freely given to others, and Mr. Stainton's work on the *Tineina* acknowledges its value. He was a type of a kindly German pedagogue and naturalist which hardly exists elsewhere.

A. R. G. in *Papilio*.

CHARLES ARNOLD,

of Paris, Ontario, died after a short illness on the 15th day of April, 1883. Although not an active worker in the Entomological field, he was a close observer of the habits of insects, especially such as are injurious to agri-

culture and horticulture, and in this way a most useful member of our Society. He was quiet and unobtrusive, but his work, especially as a hybridist, made him widely known. He originated many good varieties of fruits, cereals and other useful plants, some of which are much appreciated. Few men have done so much good in so quiet a way.

PROF. TOWNEND GLOVER,

long so well known as Entomologist of the Department of Agriculture in Washington, died on the 8th of September from an attack of apoplexy, at the house of his adopted daughter in Baltimore, in his 71st year. He was a most careful and painstaking observer, a good draughtsman and an excellent engraver, and employed his every spare moment in producing figures of American insects. In the preparation of these plates his industry was incessant, and the wonder is how, in one short life, he could have accomplished so much. The plates, with the accompanying notes, have been purchased by the United States Government, and it is hoped that they will be published in sufficient number to admit of their being available to educational institutions and students of Entomology throughout the country. A complete set of his beautiful works, of which only fifteen copies are extant, have been secured for the library of our Society. He was an honorary member of the Entomological Society of Ontario, and ever felt a deep interest in our work.

V. T. CHAMBERS,

A valued contributor to the pages of the CANADIAN ENTOMOLOGIST, died on the 7th of August, his fifty-second birthday, at his home in Covington, Kentucky. He labored long and ardently on the Micro-Lepidoptera, and in his numerous descriptions of species and careful notes on their habits, has left behind him an enduring monument. He began a series of papers on Micros in the third volume of our journal, published in 1871, publishing ten papers before the end of that year. These were followed by twelve papers in volume 4, nine in vol. 5, ten in vol. 6, nine in vol. 7, seven in vol. 8, ten in vol. 9, four in vol. 10, four in vol. 11, one in vol. 12, two in vol. 13, and one in vol. 14, seventy-eight papers in all, besides a few communications on other Entomological subjects. His writings have added much to the interest and value of our journal, and we shall miss him much.

DR. JAMES S. BAILEY,

Of Albany, N. Y., died at his residence, No. 95 Eagle St., on July 1st, after a protracted illness. He was an enthusiastic student of insects, who devoted most of his attention to the Lepidoptera, of which he possessed a fine collection. He has contributed a number of papers to the ENTOMOLOGIST, among others an illustrated one on the natural history of *Cossus Centerensis*, in No. I., vol. 11, and at the time of his death was engaged in preparing a paper on the tree-boring species of this genus for the Department of Agriculture.

CORRESPONDENCE.

Dear Sir,—While on a visit to the neighborhood of Brantford for a couple of weeks in the latter part of July, I came upon an elm stump with the bark curled loosely round it. On pulling back the bark I saw a *Calopteron reticulatum* fresh and bright. The form, with the front part of the wing covers, all yellow; the hind part, blue black. There was also one just emerged. It was a chalky white all over; the front part with a yellowish tinge, the hind part with a bluish tinge. On examining the stump and inside the bark I found clusters of pupæ, remarkable in the regular formation of the cluster. The pupæ were in straight rows, close, side by side, the row above half lapped over the row below it, each pupa of the upper row placed exactly between the two below it. One cluster was formed thus:—The lower row four; the second row four, one projecting to the left; the third row three; the fourth row two; the fifth row two, one projecting to the right. Another cluster had four in the lower row; five in the second, two projecting to the left; four in the third; three in the fourth, and finished there. Then there were twos and threes in different places, with one by itself. I visited them often to watch their appearance. Sluggishness seemed to be their principal characteristic. Slow in withdrawing from the pupa case; slow in obtaining color and consistency, and slow to go off on the wing. True, the weather was cool and showery, which would tend to increase their slowness. They did not come out in order of time according to the rows, but came from the upper and lower ones indiscriminately; but every one of them was the same

form, not a banded one amongst them—that form was abundant on the bushes at the time. There were still about half a dozen to mature when I left, but some of them were sufficiently advanced to give indications through the pupa skin what they were to be. On re-reading Mr. Coquillett's article in the May number of the CANADIAN ENTOMOLOGIST, I was quite startled on finding that he says his pupa was suspended by the hind end of its body ; for the result of my observation was to leave the impression strong on my mind that they were suspended by the head, and I did not think it strange that they were, or that anyone had thought differently. My impression of the tinge of color through the pupa skin is that the yellow was up, and on one visit there was one that seemed as if the pupa skin had just burst on the back and left the insect exposed in exactly the position it was before it burst, and I was struck with the exact resemblance in form and size, even to the pupa on either side of it. But is not this the usual position for Coleopterous larvæ to suspend?

Hamilton, Sept., 1883.

J. ALSTON MOFFAT.

[We think that when our valued correspondent has an opportunity of examining pupæ of this insect more carefully, that he will find that they are suspended by the head downwards, as in the case of the *Coccinellidæ*.—
ED. C. E.]

Having occasion lately to refer to some back numbers of the Proceedings of the Boston Natural History Society, my eye accidentally fell on a paper by Professor Alexander Winchell, read before the Michigan Scientific Association on June 24th, 1863, and entitled, "Notes on *Selandria cerasi*, Harris, as it occurs at Ann Arbor, Michigan." (p. 325.)

Glancing over the paper, I saw the following passage: "As to the remedy for this horticultural pest, it may be added to what has been already published that the odor of coal-tar effectually drives away the fly. This can be smeared over a board and suspended in the tree, a resort which I have found effectual against the plum-weevil."

Can you or any of your readers tell me if this alleged means of driving off *Cenotrachelus nenuphar* has really any virtue? I never recollect seeing the plan suggested before this.

Yours faithfully,

E. W. CLAYPOLE.

The Canadian Entomologist.

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No. 10

ANNUAL ADDRESS OF THE PRESIDENT OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

GENTLEMEN,—Twenty years ago, on the afternoon of the 16th of April, 1863, there met at the rooms of the Canadian Institute in Toronto, nine gentlemen interested in Entomology, for the purpose of organizing a Society having for its object the advancement of Entomology in Canada. These gentlemen had been called by special invitation of the Rev. C. J. S. Bethune and myself, and in addition to the nine who responded by their presence, letters of apology were received from five others, expressing regret at their being unable to attend; these fourteen comprised all who at that time took an active interest in Entomology in Canada.

A Society was duly organized under the name of The Entomological Society of Canada, with the late Professor Croft, of Toronto, as its first President. Two scientific papers on insects were presented and read, and a number of interesting insects exhibited. Application was made to the Council of the Canadian Institute for the use of a room in their building, which was kindly granted free of expense, and it was resolved to hold monthly meetings for the discussion of Entomological subjects.

In December of the same year a committee was appointed to prepare and publish catalogues of the names of insects in the orders of Coleoptera and Lepidoptera, and in May the following year the committee reported that the list of Lepidoptera had been completed and published, and that considerable progress had been made in determining the species of Coleoptera, but not sufficient to warrant the publication of the catalogue. This catalogue was completed and published shortly after. Before the close of this meeting committees were appointed charged with the special duty of paying particular attention to the study of insects injurious to vegetation.

Previous to this nothing had been done in Canada in the important department of Economic Entomology; no information was available to the farmer or fruit grower in reference to most of the insect pests which destroyed his field crops or fruit, unless he happened to be the fortunate

possessor of a volume published in New England by Dr. Harris, under the title of "Insects Injurious to Vegetation in Massachusetts," and this, although a very useful work, only partially met the wants of the practical farmer. Dr. Fitch, State Entomologist for New York, had published his first nine reports, and was almost the only active laborer in this important department of insects injurious to agriculture, but his works were not accessible to many in this country.

In scientific Entomology but little had been done in Canada up to this period. Several catalogues of the names of insects captured in this country had appeared in the "Canadian Naturalist," the organ of the Natural History Society of Montreal, and the occurrence of several rare species of butterflies had been noted. Messrs. Wm. Couper and E. Billings, of Montreal, had also communicated some papers to the same journal urging the importance of the study of Entomology and referring to the habits of some of the pine borers and other prominent insects; but the circulation of the "Naturalist" was so limited that the information given reached but few in the community.

The Entomological Society of Canada at first had no funds to enable them to publish reports of their proceedings beyond the small sum derived from the annual fees of the members, but among these were a number of active workers, who, by careful and systematic observation and study, were rapidly accumulating stores of knowledge which were destined to be of much value in the future to the great community of farmers and horticulturists. At first the proceedings of the infant Society were published in the Canadian Journal, but soon it was felt to be most desirable, in order to give them the prominence they deserved, that the records of facts observed by the members should be published in a separate form, and early in 1867 an effort was made to obtain some assistance from the Canadian Government to aid the Society in carrying out this object; but at a meeting held on the 1st of June, 1867, a communication was presented from the Finance Minister of the United Provinces to the effect that he could not recommend any fresh grants for scientific objects, as the country was on the eve of confederation. The annual report of the Secretary presented at this meeting showed that the membership had been increased to 48. The meeting was to have been followed by a field day, but the Fenian Raid, which just then occurred, called some of the members away to their duty as volunteers, and others to the defence of their homes.

In August, 1868, the first number of the CANADIAN ENTOMOLOGIST appeared under the editorship of our esteemed coadjutor, Rev. C. J. S. Bethune, of Port Hope. It was a humble looking sheet of eight pages only, and this was not promised to be issued at any regular intervals, but from time to time, as material accumulated which was thought to be worthy of publication. To meet the expenses of publication, voluntary contributions were made by many of the members, and it was thus sustained and issued monthly for fifteen months, during which time it was found to be so useful that it met with encouragement everywhere; it had also acquired a reputation abroad, and many Entomologists in Great Britain and the United States had become regular subscribers. Early in 1870, the Council of the Agricultural and Arts Association of Ontario, recognizing the important bearing of Entomology on Agriculture, liberally appropriated the sum of four hundred dollars in aid of the Entomological Society for the year ensuing, on the following conditions: That the Society continued to publish the CANADIAN ENTOMOLOGIST, that it furnish a report to the Council on insects injurious or beneficial to Agriculture, and that a small cabinet of insects illustrating the various orders be made and placed at the disposal of the Council. These conditions were gladly complied with and faithfully carried out, and the report, consisting of 64 pages illustrated with 61 cuts, was printed in the report of the Commissioner of Agriculture for that year. During the latter part of 1870 an amendment to the Agricultural and Arts Act was introduced by the Hon John Carling, then Commissioner of Agriculture for Ontario, which provided for the incorporation of the Society under the name of "The Entomological Society of Ontario," with a yearly grant of five hundred dollars from the public funds of the Province, on condition that the Society prepare annually for the Commissioner of Agriculture a report on the subject of insects injurious or beneficial to the farm and garden, with the understanding also that the CANADIAN ENTOMOLOGIST should be continued. During the period which has since elapsed, the Ontario Government have recognized the value of the service rendered by the Society to the agricultural interests of Ontario by increasing the grant several times, until it now amounts to one thousand dollars a year. The liberality of the Government has greatly stimulated the work of the Society.

The practical or economic aspect of this work has been presented to the public mainly in the series of thirteen annual reports, which have been submitted to the Commissioner of Agriculture by members of the Society,

and published in the Commissioner's report. In these publications the insects injurious to the various field crops and fruits have from time to time been discussed, together with the remedies which have been suggested for their destruction. The value of these reports is indicated by the demand which has arisen for them, owing to which it has been found necessary to greatly increase the number of copies issued ; some of those belonging to the earlier years are now quite scarce and difficult to obtain. They have been most favorably noticed by the press in all parts of America and Great Britain, and thus the good work has been brought prominently into notice. If we contrast the amount of information now available to our farmers and fruit growers on the nature and life history of destructive insects, and the best methods of subduing them, with our knowledge on this subject fifteen years ago, the vast progress made will at once be recognized, and it is to the unselfish labors of the members of our Society that much of the credit for this is legitimately due. I have no hesitation in asserting that the value of the information thus distributed has returned to the country by the losses which have been lessened or prevented many times the amount which has been granted to the Society during the past twelve years from the public moneys of this Province.

The CANADIAN ENTOMOLOGIST has been regularly issued, and is now in its fifteenth volume. The volumes published have contained a vast amount of useful scientific information, which, by its wide dissemination, has been one of the chief factors in the progress of entomology in this country. The work of our Society in this department has attracted much attention abroad, and our journal has been sought after by many of the learned Societies in Great Britain, the United States, France, Germany, Russia and Sweden, and regular exchanges of our publications with theirs on equal terms effected. Thus from small beginnings the Entomological Society of Ontario has come to be recognized as one of the important aids to scientific progress. It is much to the credit of Ontario that for some years the CANADIAN ENTOMOLOGIST was the only regularly issued periodical specially devoted to the interests of Entomology on the American continent, and that it still commands the contributions of many of the most distinguished entomologists in all parts of the country.

During the period of the existence of the Society a large collection of insects has been made, a good library accumulated, and an excellent working microscope and other facilities for the study of insects provided, all of which are readily accessible here to any of our members who may

reside in London, or who may visit us from a distance. The collection shown, at the request of the Government, at the Centennial Exposition in Philadelphia in 1876, attracted much attention, and was admitted by all to be the most complete exhibit of North American insects ever brought together; the Society was awarded a gold medal on that occasion. Last year a request was made by the Minister of Fisheries for the Dominion of Canada that our Society would prepare and exhibit a collection of such insects as were injurious to fishes as well as those which served as food for fishes, to be sent with the Canadian exhibit to the Great International Fisheries Exhibition, now being held in London, England. The arrangement of this collection was undertaken by our worthy Secretary, Mr. E. Baynes Reed, who completed the work, and sent forward in due season forty cases of Canadian insects.

The large collection of carefully determined specimens in the cabinets in the Society's rooms in London, has also served a valuable purpose as a collection of reference, where collectors from all parts of our country can name their collections, and where all the books and appliances which can aid this work are ready at hand. As our knowledge of the insect forms found in our country increases, classified lists of their names are published by the Society for the purpose of aiding students in arranging their collections, and also indicating the work which has been accomplished.

During the past year a most complete and systematic index has been prepared by our Secretary, Mr. E. Baynes Reed, to the full series of our thirteen annual reports, by means of which the information they contain, in reference to any insect or subject, may be referred to with little trouble or delay. This has greatly enhanced the value of these reports, and opened the eyes of all to the vast fund of information they contain; the results amply repay the attendant labor and outlay of this compilation, and nothing would do more to add to the value of the CANADIAN ENTOMOLOGIST than the publication of a similar general index to the fifteen volumes of our monthly, now nearly completed. I trust our esteemed Secretary may be induced to continue the good work in this direction.

We have not been afflicted with any very formidable invasion of insect enemies during the past year. At the opening of the season the apple-tree aphid, which is generally common, was, in some districts, unusually abundant, and attracted some attention. The injury inflicted by them on the apple buds was not serious, and in a few days the buds expanded,

when the lice became scattered over the opening foliage and caused no further apprehension.

Later on, the tufted caterpillar of the white-marked tussock moth, *Orgyia leucostigma*, appeared in force, having hatched in multitudes from the numerous masses of eggs attached to the twigs and limbs of various trees. These eggs are usually partly sheltered by a dead leaf, or leaves firmly adherent. The mass contains from 300 to 500 white eggs, imbedded in a frothy, gelatinous substance ; is of a grayish white color, with a nearly smooth convex surface, while there is usually attached to the mass the empty grey cocoon, from which the parent moth escaped. The eggs hatch about the middle of May, when the young larvæ at once begin to devour the leaves of the tree on which they are placed, rapidly increase in size, and when full grown present a handsome appearance. Their bodies are more than an inch long, of a bright yellow color, with a red head, three or four cream-colored tufts set in a black stripe along the back, two long black spreading plumes, extending forward on the anterior part of the body, and one at the opposite extremity. By gathering the clusters of eggs during the winter when they are easily seen, the depredations of this insect may be prevented : but should this simple measure from any cause be omitted, the larvæ may be destroyed on the trees by syringing the foliage on which they are feeding with Paris green and water, in the proportion of a teaspoonful of the poison to a pailful of water. This caterpillar is a very general feeder, and occurred this year on almost every species of deciduous tree, especially on street trees, and in lawns and parks, as well as in orchards.

The clover seed midge, to which the attention of the farmers of this Province was first called in the annual report of our Society for 1881, continues to extend its sphere of operations, and many complaints are being made of the failure of the crop of clover seed from this cause. The perfect insect is a two-winged fly, about the size and having much of the general appearance of the wheat midge. By the aid of a long ovipositor the insect pushes her minute eggs down the flower tubes in the young clover heads, and when hatched the tiny red larvæ devour the seed. In districts where this insect has fairly established itself, there seems to be but one method of subduing it, and that is to starve it out by ceasing to grow clover for a year or two. A large proportion of the larvæ may be destroyed by cutting the clover earlier than usual, just as it is coming into bloom, when, being only partially developed, most of them would perish.

The greatest danger arises from the possibility of their being distributed by the use of infested clover seed. The insect passes the winter either in the larval or pupal state, and in both of these conditions is often found amongst clover seed, and if sown with the seed the insect is placed amid conditions most favorable for its development. Seedsmen should carefully examine their seed before offering it for sale, and farmers should exercise similar caution before purchasing. The insects are very small, but are much larger than the individual seeds, and if a small quantity of the clover seed is passed through a fine sieve, these insects, if present, will be found along with the coarser weed seeds, with which clover seed is so often contaminated.

The maple Egerian, known also as the legged maple borer, *Ægeria aceris*, has prevailed during the past year in the neighborhood of London to an alarming extent, to the serious injury of some of our shade trees. These insects, which pass the winter in the larval state under the bark of the maple trees, change to chrysalids early in June, and about the middle of that month they protrude themselves from the bark to the extent of about half an inch, when in a very short time the mature insect escapes, leaving the empty chrysalis behind it. This is a very pretty, clear-winged moth, resembling a wasp, which, when its wings are spread, will measure about three quarters of an inch across. The transparent wings are adorned with bluish-black markings, the head is orange, the thorax yellow, and the abdomen bluish-black, banded with golden yellow. The female lays her eggs on the bark of the trees, preferring the red maple, *Acer rubrum*, although the other varieties of maple are also more or less affected. In a few days small larvæ hatch from the eggs, which penetrate through the bark, and feed upon the inner portion and sap-wood of the tree, making an irregular cavity, which is packed with the castings of the larva, mixed with minute fragments of wood. When full grown, it is about three quarters of an inch long, with a small yellow head and a white or yellowish white body, which is darker on the hinder segments. Where the larvæ are safely lodged under the bark, no remedy but the knife will reach them, but the moths may be prevented from laying their eggs by coating the bark with a mixture of soap and strong solution of washing soda, the mixture being made about the consistence of ordinary paint, and applied to the trees in the middle of June.

Within the past two or three years Paris green, mixed with water in the proportion of a teaspoonful to a pailful of water, has been recom-

mended as a remedy for the codling moth, the mixture being freely applied to the apple trees with a syringe or force pump soon after the fruit has set. The results of experiments conducted during the past season, go far towards establishing the value of this remedy, the number of wormy apples having been materially lessened on the trees so treated. In my own experiments, where the mixture was applied to alternate trees, the proportion of wormy fruit in some instances on the trees syringed seemed to be nearly the same as on the adjoining trees, which were not treated, the fruit on both being less wormy than usual, while in other instances there was a very unusual freedom from the apple worm. Other experimenters claim far more decided results. So promising a measure, where so much is at stake, well deserves a most extensive trial. The mixture should be applied while the fruit is quite small, and before the stem is bent with its weight; then as the eye or calyx of the fruit, on which the codling moth usually deposits her eggs, points upwards, it will more readily catch some portion of the spray. A very minute quantity lodged in the little cavity and drying there would leave a trace of Paris green sufficient to destroy the newly hatched larva as it begins to eat its way into the fruit.

The meeting of the American Association for the Advancement of Science was held this year at Minneapolis, where I had the honor to represent our Society. The attendance of Entomologists, although good, was scarcely so large as last year. Since the adoption of the new constitution, whereby the sub-section of Entomology has been merged into the section of Biology, the Entomologists have greatly felt the need of opportunities of bringing up for informal discussion many questions suggested by the experience of those present, matters which could not well be brought before the general session. To meet this need the Entomological Club of the Association has been re-organized, several interesting meetings were held, the proceedings of which have been reported for the ENTOMOLOGIST.

We have had occasion to mourn the loss by death, during the past year, of several well known Entomologists, some of whom were active members and valued contributors to our journal. The names of Zeller, Glover and Chambers are familiar to you all; these have passed away. Our list also includes the names of Dr. Bailey, of Albany, N. Y., Prof. Croft, late of Toronto, and Charles Arnold, of Paris, Ontario. Prof. P. C. Zeller, the eminent German Lepidopterist, whose labors in the Microlepidoptera have given him a world-wide reputation, died at his home near Stettin at the ripe age of 77 years. Dr. Jas. S. Bailey, of Albany, N. Y.,

a zealous worker among the lepidoptera, and an occasional contributor to the ENTOMOLOGIST, passed away on the 1st of July. Prof. Townsend Glover, who for so many years held the position of Entomologist to the Department of Agriculture in Washington, died on the 8th of September. Probably no man ever worked more persistently and continuously than he. A good draughtsman and an excellent engraver, it was his delight to make figures of every native insect brought under his notice. Our library has been enriched by his beautiful works, and the wonder is how any man in one short life could have done so much. His health having failed, he retired several years ago from his official position and active work, and spent his last days in a quiet home in Baltimore. V. T. Chambers, of Covington, Kentucky, one of our most regular and valued contributors, died on the 7th of August in his fifty-second birthday. To him we are largely indebted for the knowledge we possess of our Microlepidoptera, a field in which he ardently labored, and in which he was a worthy successor to the late Dr. Clemens. His loss will be much felt and deplored. Charles Arnold, of Paris, Ont., although not an active worker in the entomological field, was a close observer of the habits of insects, especially such as are injurious to agriculture or horticulture. He has long been a member of our Society; was with us at our annual meeting held here two years ago, and took part in our discussions. He died on the 15th of August in his 66th year. Prof. Croft was well known throughout Canada as an eminent chemist, and always took an active interest in entomology. He had a prominent part in the formation of our Society; was its first President, and always manifested the greatest interest in its prosperity. He died at the residence of his son, San Diego, Texas, after a brief illness, aged 64 years. Who will press forward and fill the vacant places in our ranks? One by one we pass away, but our favorite branch of natural science still lives, and will continue to assert its increasing importance, and confer its benefits on all succeeding generations.

WM. SAUNDERS.

PREPARATORY STAGES OF EPILACHNA BOREALIS. FAB.

BY G. H. FRENCH, CARBONDALE, ILL.

Egg.—Length .06 inch by .02 in width. In shape elliptical, rather narrow. Color dingy yellow, somewhat pulverulent. There were 56 of these found on the under side of a leaf, set on one end and about .05 inch

apart. They were found September 9, 1883, at which time they were hatching, hence the length of the egg period is not known.

Young Larvæ.—Length .06 inch. Color dull yellow, more or less brownish at the ends, the sides of the head distinctly brownish. Each joint bears six branching spines concolorous with the body. In outline somewhat elliptical, the head being nearly as broad as the middle of the body, but the anal joint is not. Length of this period 5 days.

After First Moults.—Length .10 inch. Shaped much as before, oblong elliptical. Color pale dull yellow, clearer than before the moult. Number of spines the same, about 3 branches to each. Head blackish on the sides. Length of this period 6 days.

After Second Moults.—Length .20 inch. Shape and branching spines as during the last period, except there are more points to each spine than before, seven counted on one. Ground color yellow, clearer than before moult, eyes blackish yellow, a black spot in the lower part of each, and a spot below the eyes blackish yellow. Legs, except the articulations, smoky yellow. Tips of spines brown. More narrowly elongate than during last period. The length of this period not known, as the food plant died, mostly from attacks of these insects. Before finding the eggs, however, I had taken a description of a mature larva and pupa, as well as pupal period. From what I observed then on the food plant earlier in the season, I know that the principal differences that would have been noted on the stages between the second moult and the mature larva were those of size.

Mature Larva.—Length from .35 to .40 inch. Elliptical in outline, the width and height through the middle of the body .15 inch. Color yellow, each joint with 6 branching spines which are yellow on their basal half, the rest black, there being about 9 branches to each spine. Eyes and ends of tarsi brownish black.

Chrysalis.—Length .35 inch, of an outline similar to the mature larva; yellow, moderately covered with short hairs, black and white mixed. Length of this period 8 days.

Dr. Packard says of this: "The larvæ, according to Osten Sacken, are common on the leaves of the pumpkin. It is yellow, with long, brown, branched spines, arranged in rows of six on each segment, except the first thoracic segment, which has only four." I found them feeding on *Echinocystis Lobata*, or the common prickly cucumber, and found not

only the larvæ, but the beetles, feeding freely on the leaves, showing no disposition to feed on plant lice, the generally acknowledged food of the *Coccinellide*. To test this, one of the beetles was placed in a jelly dish with a leaf, upon which it at once went to feeding, and I saw them doing the same thing on the vines. The larvæ in feeding eat the whole of the tissue on the under side of the leaf, except the veins, leaving the upper epidermis. The beetles usually eat this, leaving only the veins.

Assuming the egg period to be 5 days, and the third and fourth larval periods the same as the first and second respectively, we would have a period from the egg to the imago of 35 days, which can not be far from correct. They probably pass the winter in the imago state, as do others of the family.

PSEPHENUS LECONTEI—ON THE EXTERNAL ANATOMY OF THE LARVA.

BY D. S. KELLCOTT, BUFFALO, N. Y.

This singularly interesting larva occurs in abundance in the rapids of the Niagara above the Falls. The writer has taken it in other rapid streams in Western New York, also at different places in Michigan; besides, its occurrence in widely separated localities has been recorded by observers, hence we are led to believe that it is distributed throughout Eastern North America. Dr. Leconte has described another species, *Ps. haldemanni*, from the peninsula of California; its larva, it seems, has not been described.

The first notice of our larva is that by Dr. Kay in Part VI. (Crustacea), page 53, Zoology of New York, 1844. It is described in that work as a new genus and species of Crustacea, under the name *Fluvicola Herricki*; a poor figure is given. Dr. John L. Leconte, in Agassiz's Lake Superior, page 241, 1850, describes it more exactly; he gives an account of the parts of the mouth; no figures are given. In the proceedings of the Philadelphia Academy of Sciences, Vol. VI., page 41, 1852, the same author has a brief account of the larva, but adds no additional facts. In Dr. Packard's Guide to the Study of Insects, page 450, 1870, the characteristics of the larva are briefly stated, and a figure is given which shows well enough the outline of the insect.

The present paper is intended for a supplement to those already published, while it is believed that in a few instances inaccuracies in them are corrected, and some omissions are supplied; yet it is acknowledged that it is far less complete than it might have been, had full advantage been taken of the material at hand. The dissected parts, particularly those of the mouth organs, which served for the drawings of the figures, have been mounted in balsam for preservation.

The larva of *Psephenus* has been compared with those of *Helichus* and *Elmis*; from the latter it is said to differ in no important particular. Figure 2 of the plate represents a larva supposed to be that of *Helichus lithophilus*, Germ., and is introduced for the purpose of comparison with *Ps. Lecontei* (Fig. 1). The general resemblance is close, some essential differences appear, but no full description of the larva of *Helichus* is at hand for comparison.

The young larva of *Psephenus* is found clinging to stones, the shells of *Unio*, old wood and the like, usually where the flow of water is considerable, often in the wild rapids, yet they have been taken in quiet water along the shore, or even in ponds entirely cut off from flowing water; their flat, disc-like form, concave below, marginal cilia and powerful legs enabling them to resist the swiftest current.

Excluding the head the larva is made up of twelve rings; the body proper is but little broader, relatively, than that of many other Coleopterous larvæ; the shield form is due to an uncommon extension of the tergal folds, *pleurites* of the first ten body rings. The prothoracic segment is broad, and extends over the head like a buckler; it is divided by sutures into six parts; those on either side of the median suture are each divided into two by a suture from near the anterior edge obliquely backwards to near the middle of the posterior border; the external pieces correspond with the *pleurites* of the following rings (Fig. 1, *a*). The second and third thoracic rings are broad, nearly equal, the expanded plate of the mesothorax is, however, more wedge-shaped than that of the post-thorax, in order that its outer margin may complete the outline curve with the prothorax. The first three rings occupy one half of the expanded surface of the larva.

The seven succeeding abdominal rings have nearly equal length, but gradually diminish in width from the first, the widest part of the body, to the eighth and ninth. These two have nearly equal width. They are, however, considerably longer than the abdominal joints above them. The

terminal joint is thick anteriorly, but posteriorly it becomes membranous, thus agreeing with the pleurites of the anterior rings ; the anal opening is situated in the thickened part (Fig. 1, *b*). The abdominal segments from one to seven, like those of the thorax, have each a wide, more or less wedge-shaped lateral expansion ; that of the first extends at right angles to the body, but those of the following rings are, more and more, directed backward, that of the seventh being parallel to the line of the body, so that the oval outline of the larva is preserved, although the eighth segment lacks the prolongations. There is a plain suture in the median or dorsal line (Fig. 1, *c*) ; there is also one dividing each ring at the base of the pleurite (Fig. 1, *d*). These lateral sutures or fissures are more pronounced on the terminal segments. The anterior, free edges of the pleurites bear a few stiff hairs, while the outer edges are furnished with a close-set ample fringe of sub-equal hairs.

The general color is grayish brown ; under a lens there are blotches of a darker hue spread over a lighter field ; moreover, the whole upper surface is marked with irregular lines of black dots, which appear to be elevations.

"The articulation itself is prolonged each side for a short distance between the laminae of the expanded epidermis, so that the outline of the proper fleshy portion is serrate." The epidermis of the upper surface is somewhat corneous and thick. Figure 4 shows a cross-section of the second abdominal segment. It exhibits the almost uniform arch above and the thin tegument of the ventral surface extending out to form the under surface of the pleurites.

The *head* is not retractile, except in the sense that the upper surface of the prothorax is permanently prolonged over and beyond it. The head is flattened above ; the epicranial suture is short, the clypeo-cranial sutures extending well up on the top of the head ; they terminate at the place of insertion of the antennae. The suture separating the clypeus from the labrum extends from antennae to antennae (Fig. 5, *c*). There are six ocelli in each group. When mounted as transparent objects, each shows an oval outline, with a clear border surrounding a dark, more or less, oval center. The resemblance to the reptilian blood corpuscle is very close. Five of the ocelli are in a slightly curved line with their longer axes nearly parallel ; the sixth is placed at the upper outer angle of the group, with its axis at right angles to those of the others. It is also the largest one of the group (Fig. 9). There is a little patch of hairs between the ocellus and the adjacent suture.

The antennæ are as long as the head, and four-jointed; the first or basal joint is short and stout; the second is cylindrical, or but slightly narrowed at the upper end, nearly straight, and as long as the width of the labium, or a little more than half the length of the whole antennæ; there are a number of long hairs or bristles on the outer side of the distal half of this joint; the third is more slender, slightly more than half the length of the second (Fig. 5, *a*); the fourth joint is represented by two very short articles inserted in the third, so that they resemble a pair of minute forceps; the larger of the two has a cuspidate apex (Fig. 6).

The *labrum* is broad, the anterior margin straight, or slightly rounded, the outer corners convex; the outer third bears a row of rather coarse spines, the two extreme ones being much stouter. The labrum extends beyond and bends down over the mandibles. Its concave under surface is beset with many stiff hairs, some of which extend beyond the margin, forming a fringe. In the front, near the middle of this concave surface, there are eight protuberances; four smaller ones in a group; outside of these, two on either side, are situated the remaining larger ones. These are tooth-like (Fig. 12, *a* and *b*). Beginning back as far as the middle of the mandibles is a corneous strip, which soon divides, the branches extending to the outer angles of the labrum (Fig. 12).

The *mandibles* are large, brown or black towards the tips. Seen from above the outline is triangular; in the younger larvæ these organs are relatively shorter, making the outline more nearly that of an equilateral triangle. The basal edge is slightly convex, and bears just beyond the middle the ball for the articulation of the organ with the elbowed corneous support of the cheeks. (In some examples the ball appears to be situated nearer the outer angle than in others). At the inner angle there is a process and a chitinous piece, apparently articulated with it, to which the tendon of the flexor muscle is attached; the outer angle is somewhat re-entrant; the termination of the extensor muscle appears to be quite similar to that of the flexor; the outer edge is nearly straight, bending inwards a little towards the apex; the inner line is straight to near the middle where it bends in the blade, becoming spoon shaped; the biting edge is evenly rounded. When the organ lies with the inner face uppermost, it is seen that in the basal part there are two laminæ not united with each other on their front and posterior edges; at the lower part of the concave part of the blade arise two tufts of hair, the outer one is short and bristle like, the other is long, reaching back and nearly across the throat (Fig. 8).

The *maxillæ* are complex; the stout cardinal piece is chitinous, bearing on its surface two sharp hooked teeth; the superior part is divided into two lobes, the outer one is soft and fleshy, rounded at the apex, having its surface beset with long, stiff hairs; the inner one is concave above, and bears at its apex four stout teeth, which have rounded extremities and the inner face concave; along the inner surface of the lobe there are several strong pointed curved spines. The maxillary palpi are four-jointed; the basal joint is short and broad; the remaining articles diminish regularly in diameter; the second and third are about the same length, equal to twice that of the first; the third is rounded at the end, and more than half the length of the fourth. There are apparently several minute tubercles on the rounded surface of the extremity. The same appear on the corresponding joint of the labial palpi (Figs. 5 and 10).

The *labium* extends over the under surface of the jaws nearly to their tips; its texture is membranous; its surface is densely clothed with hairs; the somewhat quadrate mentum is situated between the stout maxillæ. On its outer sides there are two elevated corneous pieces; they each have a pointed, tooth-like upper extremity. A long hair arises from its outer surface. A faint suture divides the anterior or palpi bearing part from the mentum. This piece is as wide as the distance between the maxillæ; the front edge is bisinuate; the labial palpi are situated at the posterior outer angle of this palpigerous piece. They are three-jointed; the first and second are stout, and the terminal one narrower and bent inwards. These organs project a little beyond the anterior edge of the labium (Fig. 11).

The legs are rather long and muscular. The tarsus ends in one strong claw; there are many stiff hairs over the surface. Above the claw there is one long, straight bristle; just above it, on the inside, there is a little tuft of bristles.

The *branchiæ* are situated on the posterior border of the ventral surface of the second, third, fourth, fifth and sixth abdominal rings—five pairs in all. The stout branchial trunk, a short distance above its origin, bends outwards, and bears along its lower surface eleven long filaments, the middle ones are longest. These long white organs are seen waving to and fro continually while the animal is alive. This motion appears to be due to the up and down strokes of the last segment, which repeatedly strikes the water as the tail of a cray fish does when swimming. A large tracheal tube may be traced, on either side, from the posterior border of the eleventh ring forward, over the insertion of the branchiæ, connecting with

them into the thorax (Figs. 4 and 7). No tuft of branchiæ thrust out and withdrawn at will, as in *Helichus*, could be seen, after watching living specimens for hours, and after dissecting many examples. The writer is inclined to think it does not exist, and that respiration is wholly accomplished by the ventral branchiæ.

It may be interesting to note the different sorts of hairs found upon the body and organs. These are, of course, those of the usual pattern common to all parts of the body surface. Found on the antennæ there are long, blade-like hairs, with their edges spined; they occur elsewhere (Fig. 13, *a*.) A modification of this sort is common on the legs, etc. They are short, with the spines finger-like (*b*); another variety is long and irregularly branched, found upon the labium and palpi (*c*); still another form fringes the posterior border of the *pleurites*; they have a short stalk, from the top of which radiate numerous fibres, fan-like (*d*). The hairs of the border fringe are invested in a sheath slightly colored brown. Immersion in potassa removes them from their sockets, leaving the edge of the segment serrate.

EXPLANATION OF THE FIGURES.

Fig. 1.—Larva of *Psephenus Lecontei*, dorsal view, magnified eight times; *a*, suture; *c*, dorsal suture (dotted line should extend further); *d*, suture base of pleurite; *b*, anus.

Fig. 2.—Larva of *Helichus lithophilus*, enlarged eight times; *a*, dorsal stripe; *c*, one of four light spots; *b*, anal tuft of branchiæ, protruded or withdrawn at will.

Fig. 3.—Leg of *Ps. Lecontei* (enlarged).

Fig. 4.—Cross section of second abdominal segment (enlarged); *c*, *c*, pleurites; *b*, *b*, branchiæ.

Fig. 5.—Head (enlarged); *a*, antennæ; *b*, maxillary palpus; *c*, chitinous band on under surface of labrum; *d*, ocellus.

Fig. 6.—Tip of antenna, showing forceps-like terminal joint (enlarged).

Fig. 7.—Branchia.

Fig. 8.—Mandible (enlarged one hundred times); *b*, chitinous support, the cheek articulating with the mandible; *b*, flexor muscle of the jaw; *c*, ball article; *t*, tufts of hairs.

Fig. 9.—Ocelli.

Fig. 10.—Maxilla; *a*, palpus; *b*, inner lobe; *c*, outer fleshy lobe; *d*, cardia; *e*, pointed papilla. Magnified one hundred times.

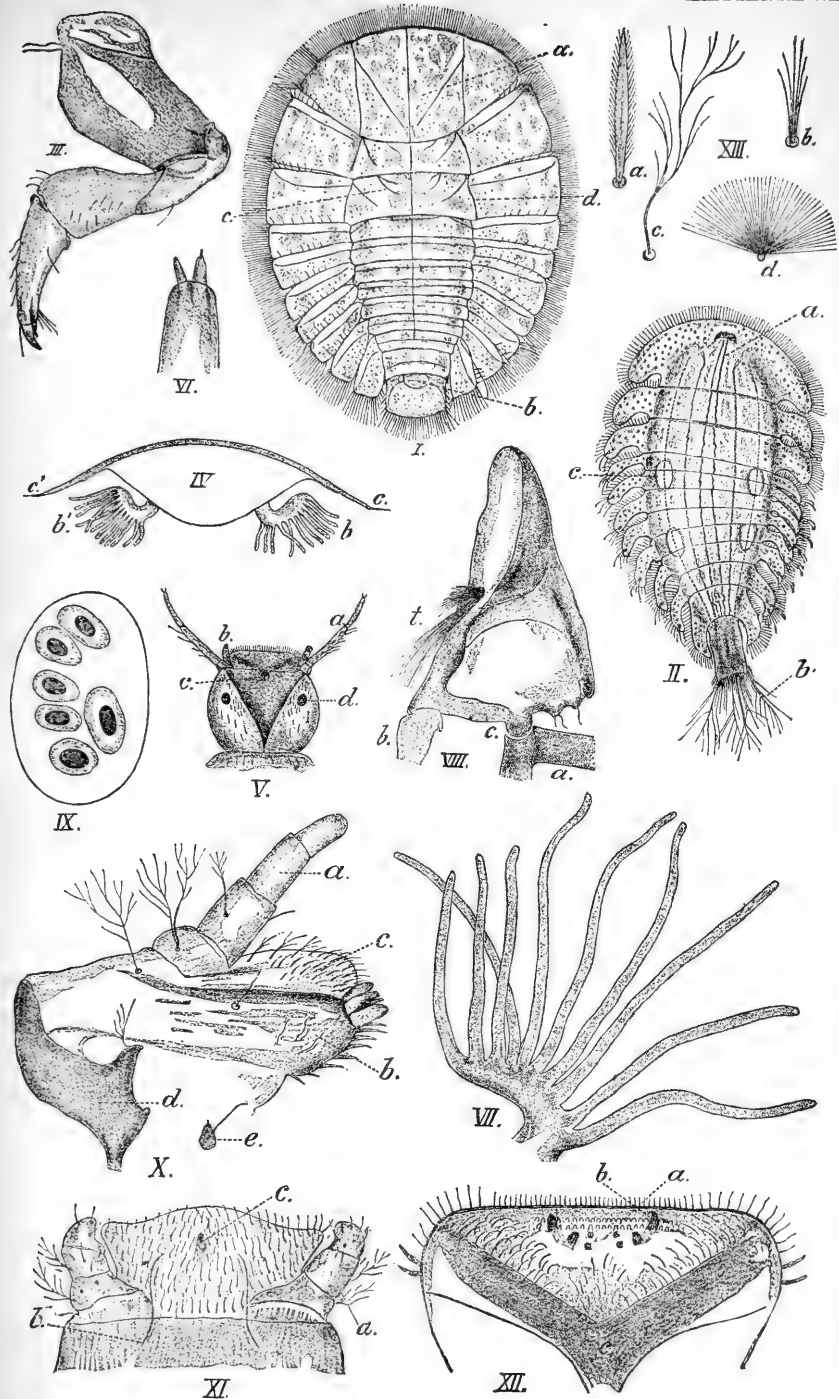


Fig. 11.—Labium ; *a*, palpus ; *b*, mentum ; *c*,

Fig. 12.—Labrum ; *a*, four small papillæ ; *b*, four strong teeth ; *c*, chitinous support. Enlarged one hundred times.

Fig. 13.—Hairs of different types ; *a*, from antennæ and elsewhere ; *b*, legs, etc. ; *c*, palpi ; *d*, posterior border of the pleurites.

CORRESPONDENCE.

FURTHER NOTES ON THE PSYLLIDÆ.

If I might judge of the feelings of the readers of the CANADIAN ENTOMOLOGIST by my own, I should say that they were much obliged to Prof. Riley for his note on the Psyllidæ, and for the accompanying illustration. Figure 7 of that illustration is, however, imperfect, in that (1) it fails to show the feet of the insect—an important consideration as regards Westwood's classification ; (2) it gives the appearance of the *dried* galls on an apparently fresh leaf : the fresh galls are much more pear-shaped—in many instances they are nearly globular ; (3) the section of the gall does not show the hardened inner roof of the cavity or cell.

I hope Mr. Riley will pardon me if I say that he indulges a tendency to be needlessly exact. When I wrote my description (and it proves to be the first description published) of the *Psylla* under our notice, I used the indefinite article *a*. In my subsequent note, when the insect had been distinguished by Prof. Riley's remarks—at any rate, when it was the insect under our consideration, I wrote *the*. The Professor seems to think that the readers of the ENTOMOLOGIST will mistake my meaning. I feel sure that they will not.

With regard to the term *Celtidis*, Endlicher and De Candolle (and the latter is undoubtedly a great name amongst Botanists) could scarcely have known Latin better than Pliny ; and one cannot help feeling that, as regards *Celtidis*, they went—well, to use Mr. Mantalini's gentle euphemism, “to the Bow-wows” for their Latinity. The nettle-tree, perhaps, was useful to the Celtic females, as the fig-tree was to Mother Eve ; but the tracing of *Celtis*, gen. *Celtis*, to *Keltidos*, genitive of *Keltos*, is indeed

"*Græca obscura*, as Linnæus puts it." The foreign authors referred to have evidently fallen into error in this matter.

Let us now see what we have before us concerning the Psylla. Mr. Fletcher, in his interesting paper on the Homoptera, in the Society's last report, gives us Prof. Riley's notice of the Flea-lice of the Nettle-tree "in full." That notice is a mere allusion, a reference to a gall, not a proper description of the insect, as Prof. Riley assures us. The Professor tells us also that *P. venusta* has not been properly described. Osten Sacken's account, supplied to me by a friend, is this: "I raised out of the gall a beautiful large Psylla—*Ps. venusta* n. sp.—with the wings variated with black. The peculiar shape of the apex of the metasternum and the venation of the wings will, perhaps, necessitate to make a new genus for this species." Mr. Fletcher has shown that the tree, *Celtis occidentalis*, is rare in Lower Canada. When, then, I met with this rare tree, and found the undescribed Psylla upon it, I felt justified in sending a description of the insect to the ENTOMOLOGIST. But, really, the tone of Prof. Riley's remarks gives rise, within me, to an uneasy feeling that, somehow, I have been trespassing on the Professor's private preserve of Pachypsyllids. I can only offer as my excuse that, as Entomologists, we want information. What information have we concerning the Psylla we are considering, apart from my own description, and Mr. Fletcher's admirable account published subsequently? What, beside the illustrations, has Prof. Riley added to our stock? He tells us that he called an insect, already named *P. venusta*, "*P. celtidis-grandis*"; that this insect is very large (Osten Sacken had told us it was large); that there are differences, as regards position and size, between the gall it produces and that produced by *P. celtidis-mamma*; that *P. celtidis-mamma* so closely resembles another species, however, that "without the galls, it would be difficult, if not impossible, to separate them—a not uncommon occurrence among gall-producing species."

Now, an accidental puncture, by the mother Psylla, of the leaf-stalk, through which the nourishment of the leaf flows, would naturally produce a larger excrescence than a puncture of a vein; and a larger supply of food would as naturally produce a larger insect. We know, to our sorrow and perplexity, that the rage for re-classification, and for raising varieties into species, is becoming a vice on this side the Atlantic. And we really have nothing before us to show that the *P. venusta* of Osten Sacken, and

the *P. celtidis-mamma* of Riley, are not one and the same insect—the Peppered Flea-louse of my own description. They may be very distinct species, but Prof. Riley has not yet made it clear that they are.

THOS. W. FYLES.

Dear Sir,—I write to you in reference to *Sphyracephala brevicornis*, Say; the only representative of the family *Diopidae* and the genus *Sphyracephala* in the United States. This curious and seemingly rare Dipteron was taken by me on the 18th of August last; on that occasion I took three specimens in about five minutes, but had to leave the place as quickly as possible on account of an approaching storm; but, however, I visited the same place two weeks later and succeeded in taking about a dozen specimens in about half an hour. The specimens were taken in Fairmount Park, near the same locality where Say first took his specimens. Although I have been seeking this insect for two seasons, this was the first time I ever saw it; its small size is very apt to make it escape the notice of any general collector. My specimens were caught on some plants growing near a small brook. They seem to be very local indeed, for I have hunted in similar situations over the Park and in the county, but have never seen any except in that one particular spot. *Ochthera mantis* DeG. is also taken in damp situations, but this fly is quite common and can be taken nearly all the summer, for, comparing my notes, I took it on May 7, June 17, during July, August 5 and 12. Hoping my observations may be of some avail to collectors in hunting it, I remain,

Philadelphia, Oct. 8, 1883.

EUGENE L. KEEN.

EGGS OF NEMATUS VENTRICOSUS.

Nematus ventricosus was seen to deposit thirty eggs, June 7, upon a single currant leaf within one hour. In the act of ovipositing, it curved the tip of its abdomen downward and forward, directing its ovipositor toward its head, in which position the end of the egg is seen to protrude and attach itself to the leaf-nervure, when the ovipositor is withdrawn, and the egg left in position. Moving backward a very little, another egg is similarly deposited, and in like manner the operation is continued, until the leaf has its assigned quota, or the supply of eggs is exhausted. The eggs produced their larvæ on June 14th.—*Psyche*, May-June, 1883.

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No. 11

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The annual meeting of the Society was held at London, in the Society's Rooms, Victoria Hall, on Wednesday, October 3rd, 1883, at 7:30 o'clock p. m.

The President, Mr. William Saunders, of London, Ont., in the chair.

Present—Rev. C. J. S. Bethune, M. A., Port Hope; Rev. T. W. Fyles, Levis, P. Q.; James Fletcher, Ottawa; R. A. Hanham, Paris; W. H. Harrington, Ottawa; J. M. Denton, London; B. Gott, Arkona; A. Pudicombe, London; F. C. Lowe, Dunnville; H. P. Bock, London; W. E. Saunders, London; J. Magnus Johnston, London; the Sec.-Treas., E. Baynes Reed, and others.

The minutes of the previous meeting were confirmed, the reading being dispensed with, as they had already been printed and sent to the members.

The President addressed a few words of welcome to the members, expressing the pleasure which the London brethren felt at meeting their fellow workers from the various parts of the Province.

The report of the Council and the financial statement of the Sec'y-Treasurer for the past year were then read. and on motion duly received, discussed and adopted.

The report of the Montreal Branch was next submitted and adopted.

The President then read his annual address, for which he was unanimously awarded a vote of thanks, and requested to publish it in the CANADIAN ENTOMOLOGIST.

Mr. James Fletcher, of Ottawa, then presented the report of the Entomological Society of Ontario to the Royal Society of Canada, which was received and adopted, after which Mr. Fletcher was unanimously re-elected the representative from the Entomological Society to the Royal Society for the coming year.

ELECTION OF OFFICERS.

The election of officers then took place, when the following gentlemen were duly elected :—

President, Wm. Saunders, London.

Vice-President, James Fletcher, Ottawa.

Secretary-Treasurer and Librarian, E. Baynes Reed, London.

Council—Rev. C. J. S. Bethune, M. A., Port Hope ; Rev. T. W. Fyles, Levis, P. Q. ; W. H. Harrington, Ottawa ; John M. Denton, London ; J. Alston Moffat, Hamilton.

Editor CANADIAN ENTOMOLOGIST, Wm. Saunders.

Editing Committee—Rev. C. J. S. Bethune, J. M. Denton, E. Baynes Reed.

Auditors—H. P. Bock and W. E. Saunders, London.

REVISION OF THE SOCIETY'S PRINTED LISTS OF INSECTS.

On the motion of Rev. C. J. S. Bethune, duly carried, it was resolved that the Society should, as soon as possible, publish a Revised List of the Canadian Diurnals, adopting as a basis the list and classification of Mr. W. H. Edwards, of West Virginia : and that the Society should also publish additional lists of such moths as have been found to be Canadian, and are not contained in the Society's existing lists.

In view of the desirability of the publication of the descriptions of hitherto undescribed larvæ, and with a view to aid therein, the President, Vice-President, Rev. C. J. S. Bethune and W. H. Harrington were appointed a committee to prepare blank forms for the use of members in describing larvæ : the Society being of the opinion that following the practice of Westwood and Stainton, the body should be considered as consisting of thirteen segments, the head being the first.

The Rev. T. W. Fyles then read an interesting paper on "Observations on Form and Color as Exhibited in Insect Life."

A. A. A. S.

The President submitted a report of the proceedings of the Entomological Club of the American Association for the Advancement of Science, held at Minneapolis in August last, which he attended as the representative of the Entomological Society of Ontario.

DISCUSSION ON MISCELLANEOUS ENTOMOLOGICAL SUBJECTS.

Mr. Fletcher exhibited a borer found by him injuring maple, the insect being a small moth belonging to *Hepialus*, or some closely allied genus. This insect was new to the members.

Rev. Mr. Bethune stated that he had found, in a large burrow in an oak tree, the empty pupa case of a species of *Cossus*.

Mr. Harrington had also found this insect quite common in the oak, and had frequently seen the empty pupa cases protruding from the bark.

Mr. Fletcher reported that he had found *Cossus centerensis* common about Ottawa on the Balm of Gilead tree, *Populus balsamifera*. The pupa is usually extruded from the bark about 4 o'clock in the afternoon. He had frequently seen them at this time of day working gradually out. The imago generally escapes within an hour after the appearance of the pupa. He also reported finding *Buprestis fasciata* common on poplars, and had found a larva in poplar wood which he thought, from its appearance, might belong to that species.

Mr. Harrington said he had lately found the larva of a very small fly, *Cecidomyia robiniae*, on locust trees about Ottawa. These larvæ turn down the margins of the leaves, and live within the enclosure thus formed.

Mr. Fletcher had found the stems of sunflowers much bored into by some insect, and exhibited a larva which he had taken boring into the stem of a lily, *Lilium Canadense*.

Mr. Reed exhibited a larva which he had taken recently feeding on oak. It evidently was a species of *Smerinthus*, but did not seem to correspond to any hitherto described larva of this genus to which he had been able to refer.

Mr. Saunders made some reference to the manner in which the eggs of the round-headed apple-tree borer, *Saperda candida*, are placed. He had, until lately, held the opinion, in common with other Entomologists, that the eggs are laid on the surface of the bark of apple trees near their base, but he had recently received from a correspondent, Mr. C. G. Atkins, of Manchester, Maine, specimens of the eggs deposited in young apple trees, with pieces of the bark in which they had been placed, from which it was quite evident that the beetle bores into the bark and deposits her eggs in the channel thus formed.

Mr. Fletcher said he had raised a brood of the larvæ of *Smerinthus exocatus*, and found them to feed readily on *Populus balsamifera*, and also

on *Populus alba*, the latter known as the Silver Abele tree; the larvæ varied very much in coloration. Hitherto this insect has been supposed to feed only on apple, plum, and wild cherry.

Mr. Saunders stated that he had found the larvæ of *Papilio turnus* this season on a new food plant, *Magnolia accuminata*. As many as forty or fifty specimens were found on a single tree; they varied in size from the newly hatched to the full grown larva, all feeding together; eggs were also found at the same time and place.

Mr. Fletcher reported finding the larva of *Darapsa versicolor* feeding on swamp loosestrife, *Nesaea verticillata*. He had bred a single specimen two years in succession. It is curious to note that this plant grows in the water, and being herbaceous, decays and becomes submerged during the autumn and winter months. In these instances there was no favorable pupating place nearer than the shore, so that the larva would have to swim ashore, unless it formed its cocoon among the leaves and these drifted to land.

Mr. Reed exhibited and reported the larvæ of *Notodonta albifrons*, Sm. and Abb., as common in London on the maple; he had also observed them recently on the elms in Toronto and Montreal. Other members had found them generally common this season on the oak.

Mr. Saunders had found the larvæ of *Papilio cresphontes* on the wafer ash, *Ptelea trifoliata*; also on the prickly ash, *Zanthoxylum Americanum*. At this late period of the year (September) the larvæ may be found quite small. Query.—Do these perish from early frost? If not, how do they pass the winter?

The meeting then adjourned, to meet next morning at 9.30 a. m.

Thursday Morning, October 4.

The meeting opened at the Society's rooms at 9.30.

The question of the use of Paris green for the codling worm of the apple, *Carpocapsa pomonella*, was discussed, and while the members concurred in the desirability of testing this remedy very fully, they recommended that due caution should be used in preparing the mixture, not to make it too strong, one teaspoonful of the poison to a pailful of water being sufficient; if used much stronger than this it is apt to injure the foliage.

An interesting communication was read from Mr. J. Alston Moffat, of Hamilton, on the pupa of *Calepteron reticulatum*. He has found speci-

mens under the bark of an elm stump, curiously arranged in regular rows ; Mr. Harrington had also observed the same species, and remarked that Drs. Leconte and Horn, in their new Classification of Coleoptera, referred to these curious groups of pupæ.

Mr. Fletcher had found *Mamestra picta* very abundant at Ottawa on cabbage, carrots, and many wild plants.

Mr. Harrington remarked that *Lycomorpha pholus* had been very common in the vicinity of Ottawa this season ; he had seen hundreds of them ; had also found *Ædipoda corallina*, Harris, quite common in oat fields.

Rev. Mr. Fyles reported the currant worm, *Nematus ventricosus*, as being very abundant at Levis, P. Q., where the bushes had been almost destroyed by them. He also stated that much injury had been caused to the tamarack trees, *Larix Americana*, in Bury and the neighboring townships, by a species of Saw fly, probably *Nematus Erichsonii*, the insect which has caused so much injury to this tree in Maine and other Eastern States.

Mr. Harrington informed the members he had found *Xyphidria albicornis* boring on maples, chiefly on young trees where the bark was thin. He had observed them ovipositing from the middle of June to the end of July. The ovipositor is short. He found in one instance a tree thoroughly riddled by the borers, they having penetrated directly into the wood.

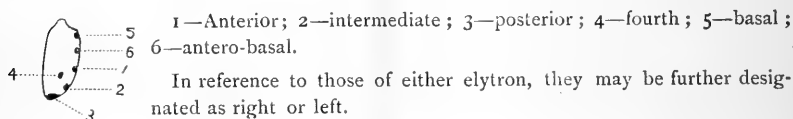
The members having spent some time in examining interesting insects in the Society's collection, as well as those brought to the meeting ; and also having availed themselves of the opportunity of reference to many of the valuable books in the Society's library, brought to a close a most interesting and profitable session.

ON THE VARIATION OF THE ELYTRAL MARKINGS IN *CICINDELA* *SEX-GUTTATA*.

BY C. H. T. TOWNSEND, CONSTANTINE, MICH.

In this species of the genus *Cicindela* there are several very marked varieties, differing in the number, size and manner of disposing of the markings on the elytra ; while other less marked, yet distinct forms, com-

ing between the more marked ones, constantly occur. Being struck with the considerable differences between the specimens I have collected of this species, it occurred to me that my observations on the subject might be of interest to some others; and with that view I give them. In speaking of the spots the following nomenclature will be adopted in this article :—



The typical variety (1) is, of course, the one having three of the beautiful creamy dots on the outer margin toward the end of each elytron; or, the anterior, intermediate, and posterior spots. Where not otherwise stated, all the varieties will be understood to have these three typical spots. Others (2) have the rudiment of a fourth spot, which I have so called, near the inside margin; being what is in *vulgaris* the prolongation inward of the anterior spot in *sex-guttata*. A variety (3) just in advance of this is one having the fourth spot as well developed as the others. The one (4) next in order has the anterior spot connected with the fourth by an almost imperceptible thread; but with no extra markings on the elytra.

We come now to the forms in which the extra markings, not so frequently met with, occur. The first of these forms (5), in addition to the fourth spot, has the rudiment of the antero-basal. The next (6) has, beside the fourth, instead of the rudimentary antero-basal, the rudiment of the basal spot. The other (7) is an amalgamation of the two, having, as well as the fourth spot, the rudiments of not only the basal, but also the antero-basal, thus being really twelve-spotted—twice the number indicated by its name! Then the final (8), and one departing most widely from the typical variety, is distinguished by having the anterior and fourth spots united by a wide line into one, as in *vulgaris*, forming the irregular, band-like marking, and of nearly the same pattern, with which that species is ornamented. And further it is distinguished by having also the basal and the antero-basal spots well developed, but not connected; these corresponding to the curved band of *vulgaris*, in the same position. Although the markings are here much more developed than in the preceding, still,

on account of the connection of the anterior and fourth spots, resulting from this very development, the present variety can only be said to have ten spots instead of twelve. Another variety of which, not having met with it, I have not before spoken, is recorded by Mr. W. H. Harrington in a previous number of this periodical (CAN. ENT. xiv., 8). It is one "having only two spots (the anterior one on each elytron)." This must certainly be an interesting and widely deviating form.

As might be supposed, there are many gradations between these varieties, undoubtedly the result of promiscuous unions. In some the fourth spot, in others the connecting line, and in others still the basal and antero-basal spots are so decidedly defective that the varieties can not be determined by merely observing the outside of the elytra. In all such cases the difficulty can be easily overcome by opening the elytra and holding the insect up to the light, the under side toward you, when it will instantly be apparent what parts are not green on the outside, and the merest marking of a lighter color be detected with certainty. The two elytra are almost always alike in this respect, though sometimes one will have a faint, broken trace of a thread, while the other has none. We may notice that the spots in *sex-guttata* are arranged after nearly the same pattern as in *vulgaris*; and that where in the latter a marking becomes slight and very narrowed, it is often entirely erased in the former, the tendency of the markings in *sex-guttata* being to become more rounded and not lengthened out. Thus the curved marking at the extremity of the elytron in *vulgaris* becomes two in this species, as is likewise the case with the curved basal marking.

The appended table shows the relative number of individuals of each variety out of 49 specimens taken this summer. It will be noticed that the greater number belong to the second variety, the one with the rudimental fourth spot. Of the eighth variety I have met with none this year, but have taken several within a few years past. As the season is too far advanced now for taking the species, further observations on this interesting relation in number between the varieties must be deferred until next summer. Were it not for this, I should have endeavored to make these observations more exact by examining a much larger number of specimens before publishing the present article. However, this may serve the purpose of a foundation for further investigations on the subject.

TABLE SHOWING THE RELATIVE OCCURRENCE OF THE VARIETIES OF
C. SEX-GUTTATA.

Date of Capture.	No. Taken.	No. of 1st var.	No. of 2nd var.	No. of 3rd var.	No. of 4th var.	No. of 5th var.	No. of 6th var.	No. of 7th var.	No. of 8th var.
July 11	19	2	11	2	1		2	1	
July 13	26	4	11	3	1	1	4	2	
August 6	3		1				2		
August 23	1						1		
Summary.	49	6	23	5	2	1	9	3	
		Proper.	Rudiment of Fourth Spot.	Well Developed Fourth	Fourth and Anterior connected.	Rudiment of Antero-basal	Rudiment of Basal.	Rudiments of both.	Markings full.

AN EXTRAORDINARY HABITATION FOR A MOTH.

BY FREDERICK CLARKSON, NEW YORK CITY.

Among a number of cocoons of the family of Bombycidae collected on Long Island this autumn, I have one of *P. cecropia* of light weight. As the examination of this cocoon revealed conditions unknown to me, I have thought it desirable to make a record for your invaluable journal. The absence of the loose silk of a reddish hue which characterizes the appearance of the new made cocoon, indicated that it was a manufacture of the previous year. On opening it I found within a cocoon of *O. macrurum*, the parasite that commonly attacks the Polyphemus caterpillar. The parasite had emerged from its cocoon, as evidenced by the usual lid opening at one end, and had escaped into the outer air through the open passage that exists in the cocoon of the moth. Within the cocoon of the parasite I found a silken cocoon occupying the entire area and protruding somewhat through the opening made by the former occupant. Within it were the unrecognizable remains of a Lepidopterous larva, largely consumed by what I believe to be the parasitic Diptera of the genus *Tachina*.

DESCRIPTIONS OF NEW SPECIES OF NORTH AMERICAN BUTTERFLIES.

BY W. H. EDWARDS, COALBURGH, W. VA.

ARGYNNIS LAIS.

Male.—Expands 2 inches.

Upper side uniform bright red fulvous, slightly brown about bases of wings; the black markings all delicate: both wings bordered by a double line.

Under side of primaries pale cinnamon-red, buff in upper outer part of cell and from costa to first median nervule; a brown patch at apex and another before apex, on which are two silver spots; the upper sub-marginal spots silvered. Secondaries have the area from base to outside second row of spots yellow, mottled with dark brown: the belt beyond same spots clear yellow, the margin dark brown; all the spots well silvered, rather small, those of the discal and second rows slightly edged on upper side by black.

Female.—Expands 2.2 inch.

Upper side dull fulvous, the bases much obscured; the hind margins bordered by heavy lines, which are confluent on apical half of primaries; all the markings heavier than in the male. Under side of primaries cinnamon-red, the apical area yellow-buff, quite to hind margin, to the exclusion of the brown patches; the silver spots reduced. Secondaries yellow-buff less mottled brown, the marginal border nearly same buff, very little obscured; the spots of both rows bordering on the belt without dark edging, so the belt is unusually wide.

From several examples, male and female, taken at Red Deer River, by Captain Gamble Geddes.

This species is size of *Atlantis* and would stand between that and *Aphrodite*.

MELITÆA CHARA.

Male.—Expands 1.15 inch.

Shape of *M. Perse*, and belongs to same group. Upper side yellow-fulvous, reticulated with black, as in *Perse*; the hind margins and apical area of primaries black; the fulvous extra-discal band on same wing yellow-white next costal margin; fringes black, white at the tips of the nervules, of secondaries with a few black hairs only at the tips of the nervules.

Under side of primaries shows the black markings repeated; costal edge white; along hind margin a narrow dull orange belt, before which is a series of white crescents; secondaries have the marginal belt dull black, next the white crescents, then a series of dull orange quadrangular spots on black ground; across the disk a white band cut by a black line a little within its posterior edge; beyond, orange heavily edged with black; a white spot in cell on median nervure; a white band across the wing near base; at base orange, the shoulder white.

Female.—Expands 1.4 inch.

Less black than the male, the fulvous more red; under side as in the male.

This species may be distinguished from *Perse* by the color and markings of outer half of secondaries beneath; *Perse* has the margin buff or orange-ochraceous, the second row of spots rounded or crescent. Taken by Mr. Morrison in South Arizona and said to be common.

CHRYSOPHANUS FLORUS.

Male.—Expands 1.3 inch.

Upper side brown with a purple reflection; the hind margins broadly bordered black, especially on secondaries, the border almost reaching the discal row of spots; this row is common to both wings, zigzag; a bar on the arc of each cell; primaries have two spots in cell and one below; secondaries have a spot in cell, concealed by the long hairs which cover the basal area; at anal angle a small fulvous patch; fringes cinereous.

Under side of primaries yellow-brown, the apex light brown; the black spots repeated, enlarged, and in addition, an imperfect row corresponding in position to the inner edge of the black border of upper side. Secondaries light brown, the spots repeated in dots and minute marks; a submarginal series of red serrations from inner angle to middle of wing.

Female.—Expands 1.35 inch.

Upper side dark brown, a little mottled with obscure yellow on disk of primaries at end of cell, and outside the black spots in median interspaces only; the fulvous anal patch as in male, and an indistinct fulvous crescent in the next interspace. Under side as in male.

This species in male resembles *Hellioides* ♂, but the latter has much fulvous on hind margin of secondaries, and to both margins a narrow black border, whereas in *Florus* the borders are remarkably wide. The

female on upper side resembles not *Hellöides*, but ♀ *Sirius*. But on under side both sexes in color and markings are near *Hellöides*.

Taken on Red Deer River, B. Am., by Captain Geddes.

LYCAENA AFRA.

Male.—Expands .9 inch.

Upper side deep blue, the hind margins with fuscous borders, which on primaries are very broad ; on each wing a black discal streak ; fringes cinereous.

Under side drab ; a common mesial row of minute rounded black spots, each edged white ; on secondaries a spot on costa near base ; the discal streaks repeated, slight, with white edging.

This species was taken by Captain Geddes in the Deer River country. It belongs to the *Antiacis* group, and is the smallest member of it. Has wide black borders and a discal mark on each wing, on upper side, which is not found in other members of this group. The arrangement of the spots as in *Lygdamus*.

EUDAMUS DRUSIUS.

Male.—Expands 1.7 inch.

Upper side glossy dark brown, with eight minute semi-transparent spots on primaries ; four of them sub-apical on costal margin, three in discoidal and median interspaces, one at right angles to the lowest of the three, in submedian interspace towards hind margin, one in cell ; fringes of primaries fuscous, at inner angle cinereous ; of secondaries white, cinereous at outer angle.

Under side dark brown, the hind margins lightly dusted with whitish scales ; the spots on primaries repeated, a little enlarged ; secondaries crossed by two obscure bands, with black outlines. Body above dark brown, beneath dark gray-brown ; legs gray brown ; palpi either dark gray, or with so many brown hairs as to nearly conceal the whitish ones ; antennæ black above, beneath finely annulated with luteous ; club black above, luteous below.

Female.—Expands 1.7 inch. Similar to the male.

This species is near *Moschus* Edw. Has the spots fewer in number, smaller, and differently disposed ; beneath is darker, and the bands on secondaries are indistinct ; abdomen below without ventral line ; legs and palpi different color, the latter in *Moschus* yellowish.

Taken in So. Arizona, by Mr. Morrison in 1883.

ENTOMOLOGY FOR BEGINNERS.

TRIALS OF INSECTS.

BY R. V. ROGERS., KINGSTON, ONT.

We do not intend in this article to allude to the troubles that the members of the insect world endure in their ordinary every day life,—to their difficulties in getting out of their old clothes when nature bids them change their dress; nor to the risks they run from countless enemies, many-legged, four-legged, two-legged and no-legged,—nor yet to the labors some have to sustain in laying up their bread for a rainy season. Nor is our title intended as the text on which to found a disquisition on the sufferings that the *genus homo* has had to endure (not at the hands, but at the mouths and tails of the insect hosts) ever since that sad day when old Noah, at the advice of Archangel Gabriel (who ought to have known better) broke his word to the serpent. All of course know the legend, yet as Lord Macaulay often did for his erudite school-boy, so will we do, and repeat and give the story of the origin of all venomous anthropophagus insects. We have it from the voracious Turk, so none but a Russophile or an anti-Jingoist will doubt it, and entomologists know neither country nor politics (whatever else they may know).

Ages ago, when the righteous Noah was safely floating over the troubled waters of the angry flood in his "allotted ocean-tent," the ark drifting before the gale struck a rock and sprang a leak. In vain Noah toiled to repair the damage done and thus avoid what seemed to be the fate of all of Adam's line. At last, the old Serpent, who after having caused the destruction of the world had carefully ensconced himself in the ark, came to him and promised to help him out of his mishap if he would undertake to supply him with human flesh for his daily food when the waters should abate. The patriarch, urged by dire necessity and fear, made the promise, and the Serpent coiling himself up in the hole stopped the leak. When at length the ark rested on dry land once again and all were going out of the dark ship into the pleasant sunshine, the snake, wearied and worn, crawled out of the hole and demanded a fulfilment of the promise. The antediluvian, however, following Gabriel's advice, refused to fulfil his pledge, and seizing his benefactor, burnt him in the flames on his altar and scattered his ashes to the winds. But heaven, unwilling that the Serpent should thus be deprived of his promised

reward, immediately caused to arise from these ashes flies, fleas, lice, bugs and all such vermin as feed upon the flesh of living man.

Our article, however, is to be a legal one, and the trials to which we will allude herein will be only those in which insects have figured as principals in courts of justice. Some may imagine that the well known maxim of law, "*De minimis non curat lex*," would exclude these small fry from Dame Justice's consideration; but judges and jurisconsults have, in days gone by, paid considerable attention to the insects when their actions have been particularly obnoxious to humanity.

The delvers into antiquarian lore have brought to light nearly one hundred instances in which noxious animals were arraigned and tried for their misdeeds. The records extend from A. D. 1120 to A. D. 1741, beginning with caterpillars and ending with a cow. Some counsel learned in the law was always assigned to defend the accused. When in the Swiss diocese of Constance, grubs and Spanish flies were cited before a magistrate, he (as Felix Hemmerlin, of Zurich, tells us), taking into consideration their youth and diminutive size, appointed an advocate to defend them.

In 1545 a species of beetle infested the vineyards of St. Julien, near St. Julien de Maurienne; legal proceedings were begun against them. A lawyer appeared on behalf of the inhabitants, and another was appointed to answer for and defend the little coleopterans. But, as is often the way with criminals, these defendants were not ready for their trial, and so, having not been bound over to appear, they all suddenly left the country; all proceedings consequently dropped. In 1557 the beetles re-appeared, and did much damage. Again the aid of justice was invoked, her arm uplifted, and the wheels of the law set in motion. Domestic animals, when they sinned against man, were tried in the ordinary criminal courts, and their punishment, on conviction, was death; but wild animals who offended seem to have been within the special jurisdiction of Mother Church and tried in the ecclesiastical courts, the thunderbolt of the anathema being the judgment usually used against these dumb creatures. Said the learned canonists, "As God cursed the serpent, David the mountains of Gilboa, and our Saviour the barren fig-tree, so, in like manner, the Church has full power to exorcise, anathematise and excommunicate all creatures, animate and inanimate." Well, in this case, the Vicar-General of the Diocese appointed a judge to try the beetles and named a lawyer to defend them; for it was held that they should be treated with the

greatest clemency that justice would allow, the lower animals being the elder-born and first heirs of the earth and blessed of God, who gave them every green herb for meat. Judge and counsel being named legal discussions followed, and at last it was decided that the inhabitants should provide a piece of land outside the vineyards of the parish for the beetles, sufficient in quantity and quality for their use. This was done ; a fortnight later the counsel for the prosecution moved the Court for an order, that in default of the accused accepting the land offered they should be prevented meddling with the vineyards, under certain penalties. The advocate for the coleopterans asked time to consider, and the case coming on again after two months, he declared that he could not, on behalf of his clients, accept the land offered, as it was barren and produced nothing suitable for their food and sustenance. Issue was joined on this point, and arbitrators appointed, and then ——. Here, unfortunately, the report stops, and we know not what was the result. We are not informed who paid for the defence of these beetles, but we are told that such legal processes could never be begun until all arrears of tithes were paid to the Church.

In 1690 legal proceedings were taken against some caterpillars, who, in the way of business, were laying waste the cultivated parts of the little town of Pont-du-Chateau, in Auvergne. The Vicar excommunicated them and the Judge of the district laid an interdict upon them, and solemnly relegated them to an uncultivated spot which was duly designated.

A lawyer of France, in writing on the important subject of trials of animals, speaks (with that accuracy and truthfulness for which the members of that profession are noted) of locusts, in India, no less than three feet long, with legs armed with teeth so powerful that saws were made of them.

In 1120 some other naughty caterpillars were tried at Laon ; the next year flies came before the Court at Forigny. In the fourteenth century Spanish flies were tried at Mayence ; and in 1479 cockchafers at Lausanne. By the way, the ecclesiastical court was rather sharp on these poor chafers. After three religious processions had gone the rounds, the insects were cited to appear in the Bishop's court ; for counsel they had assigned to them one Perrodet, who had been dead six months. In consequence of his absence in the Spirit-world, the advocate did not appear in court when the case was called on, and as the chafers did not appear personally, judgment was given against them by default. They were excommunicated in the name of the Holy Trinity and the Blessed Virgin, and they and

their descendants were ordered to quit forever the Diocese of Lausanne.

We presume that in this case some of the chafers were brought into Court to hear the sentence. That step was taken some years previously in the same town, when judgment was given on non-appearance against some leeches, and a number of them were brought into court to hear the sentence that they were to leave the district in three days. By the way, the leeches proved contumacious and did not leave, whereupon they were exorcised; that process had the effect of a capital punishment, for they at once began to die off, and so went on day by day until they were utterly exterminated.

Weevils were prosecuted at Beaume in 1488, at Macon in 1501, at Cotentin in 1504, and at Troyes in 1576; these poor coleopterous long-noses seem to have been especially obnoxious to the Church. Caterpillars were tried at Cotentin in 1585, and at Auvergne in 1690. Locusts were frequently sat upon by the Judges. And as late as the eighteenth century ants were proceeded against in Brazil. These little black busybodies had so undermined a monastery of St. Anthony that it was in danger of falling about the ears of the monks; they also worked so indefatigably by night and by day at stealing the grain of the friars, that these holy men were like to starve. The lawyer for the insects on this occasion was no dweller in the Spirit-world, but a shrewd and learned servant of Justice. He argued that as his clients had received from the Creator the gift of life they had a right to preserve it as best they could; that they set an example to men in the practice of many virtues; prudence, in storing food for future use; diligence, in gathering corn (and here he quoted St. Jerome); charity, in aiding one another with heavy burdens; and religion and piety, in burying their dead. While admitting that the friars were more noble and more worthy, this bold advocate alleged that before God they were only like ants; that the advantage of reason scarcely compensated for their sin in breaking the laws of nature and of reason; that their crime in offending against God was greater than the ants' in taking their flour. That the ants had prior possession, and that if expelled they would appeal to the tribunal of their Divine Creator, who made the smallest as well as the greatest and had assigned to every one his guardian angel; and in conclusion, he asserted that the defendants would continue their mode of being, as the earth and all it contained belonged to God, and not to the monks. After a careful perusal of the evidence and consideration of the arguments, the Judge ordered the monks to select a field in the neighbor-

hood where the ants might live peaceably, and that they should remove thither at once under pain of excommunication. The sentence was read in a loud voice at the mouth of the ant-hills, when, *mirabile dictu*, immediately millions of ants came out, forming themselves into long and dense columns, and proceeded at once to the field assigned them abandoning their former dwellings. So saith the Rev. Father Mancel Bernardes, in his "Nova Floresta," and he saw the records of the pleadings and proceedings himself.

The tribunals were generally very loath to proceed to extremities and exorcise these little sinners. This was due partly to the milk of human kindness that flowed beneath the towered heads of the priestly judges; and partly because it was noticed that, upon some occasions, after having been anathematised, the noxious animals, instead of "withering off the face of the earth" (as they were expected to do and ought to have done), actually increased and multiplied, and became more destructive than before. This terrible obstinacy and depravity was deemed due to the malevolent hatred of Satan, who is, at certain times and periods, permitted to annoy and torment the sons of men.

Sometimes the opponents of the poor insects took an unfair advantage of them, and would not give them a chance of making themselves heard in Court. St. Bernard was preaching one day, when a number of flies entered the church, and disturbed the auditors by their buzzing. The saint excommunicated them, and the next day all the flies were found dead, covering the pavement with their bodies.

CORRESPONDENCE.

CAPTURES.—*Dear Sir*,—It may be a matter of interest to record the abundance of large silk worms this season in the neighborhood of London, Ont. Since the fall of the leaves the cocoons have easily been detected, and my friend, Mr. B. Bayly, and I have made the following captures with very little trouble, and in a very circumscribed district: *Telea Polyphemus*, 44; *Attacus Cecropia*, 51; *Hyperchiria Io*., 20.

LAWRENCE BAYNES REED.

FORMICA SANGUINEÆ.—Latr.

BY FREDERICK CLARKSON, NEW YORK CITY.

In a piece of uncultivated land, bordering a wood in proximity to Oak Hill, Columbia Co., New York, there are two large nests of these ants. They are in size about 4 x 2 feet, and during the eight summers of my residence at this place they have not outwardly increased much in size. The gardener has observed them for thirty-five years, and it is not improbable that they have existed for a half a century or more. I had a longing desire to open them and explore their deep caverns and winding galleries, but the gardener regarded such action as an ill-omen to the place, and an infringement upon the rights of communities that he had long protected and cared for. On one occasion I captured a dozen workers from one of these nests and carried them away about a thousand feet. I then threw them out of the glass jar in which I had captured them upon a carriage way, and, standing the jar down, watched to see what course they might take to the nest. To my astonishment every individual, after much wandering, entered the jar. I repeated the experiment; several re-entered the jar, the others travelled away in different directions and became lost in the grass bordering the road. The ants are social and live in communities, and I take it that they returned to the jar as being the last place in which they were in company.

DEATH OF DR. JOHN L. LECONTE.

It is with feelings of the deepest regret that we announce the death of Dr. J. L. Leconte, the eminent coleopterist, who died on the 15th of November, in the 59th year of his age. His valuable and voluminous writings have given him a world-wide reputation, while his uniform kindness and self-denying labors, in aiding students in his department, have won him the esteem of all who have had the pleasure either of meeting him personally, or of corresponding with him. The writer well remembers the kind encouragement which our departed friend gave him some twenty years

ago by the prompt manner in which he responded to a number of enquiries, and his readiness in undertaking the work of naming a large number of species of Coleoptera. Dr. Leconte ever manifested a warm interest in the Entomological Society of Ontario, and in the earlier volumes of our Journal are many valuable articles from his pen. His Classification of the Coleoptera of North America, published by the Smithsonian Institute in 1861, was a great boon to those interested in the study of American beetles, and greatly stimulated progress in this department, while the many excellent monographs he has written of special families have been invaluable to students.

During the period of the war his scientific labors were interrupted by pressing official duties. He was first appointed Surgeon of Volunteers, and shortly afterwards Medical Inspector, with the rank of Lieutenant-Colonel, which position he occupied for some years. Subsequently he spent three years in Europe, where he visited all the public museums and as many private ones as were accessible to him, which enabled him, with the aid of a wonderful memory, to settle many doubtful points in reference to species in his own cabinet. On his return he resumed his entomological work, which was carried on with but slight interruption until within a week or two of his death. His labors on the Rhyncophora resulted in the publication of a volume of 455 pages, entitled, "Species of Rhyncophora," in which he was assisted by Dr. Horn. This was published as a separate volume by the American Philosophical Society in 1876. Subsequently, in association with Dr. Geo. H. Horn, he prepared an entirely new work to replace his early volume on the Classification of Coleoptera of North America, in which the bulk of the families are re-arranged and a vast amount of material, which has accumulated during the past twenty years, utilized, and the whole brought into harmony with the present advanced condition of knowledge on this subject. This work, which was issued during the early part of the present year by the Smithsonian Institute, will prove a most valuable guide to students of Coleoptera everywhere, and will, perhaps, be the most enduring monument of his life work. No man who has ever lived has done as much as Dr. Leconte to advance the study of Coleoptera in America; and it has been well said that to follow the papers he has written during his busy life would be to give a history of the progress of scientific Coleopterology in America. His death will be a very great loss to American science, and an almost irreparable one to the special department in which he labored.

BOOK NOTICES.

First Annual Report of the Injurious and other Insects of the State of New York ; by J. A. Lintner, State Entomologist ; large 8vo.

This very complete and methodical report, by Prof. Lintner, occupies 382 pages, and is illustrated with 84 cuts. The volume opens with a copious table of contents, followed by a chapter on the importance of the study of Entomology, in view of the extent of insect depredations, and the immense losses insects occasion. The progress which has been made in Economic Entomology is then reviewed, and the writings of the chief workers in this field referred to, following which the various insect remedies and the best methods of using them are fully detailed. Preventives of insect depredations are next noticed, including the use of odorous substances to deter insects from depositing their eggs on plants and trees, as well as various mechanical contrivances employed for the same purpose.

Among injurious insects, those belonging to the order Lepidoptera are first taken up. They are :—The bag or basket worm, *Thyridopteryx ephemeraeformis*; the larch lappet, *Tolyte laricis*; the bronze-colored cut worm, *Nephelodes violans*; the stalk-borer, *Gortyna nitela*; the corn-worm, *Heliothis armiger*; the vagabond crambus, *Crambus vulgivagellus*; the dried crambus, *Crambus exsiccatu*s; the peach-twigg moth, *Anarsia lineatella*; the apple-leaf Bucculatrix, *Bucculatrix pomifoliella*; and the apple-tree case-bearer, *Coleophora malivorella*. The insects belonging to the Dipterous order are next noticed, beginning with some species of Anthomyiidae, next the Syrphidae, Drosophilidae, concluding with the wheat-stem maggot, *Meromyza Americana*. Those coleopterous insects which are injurious are then treated of in the following order : The rose-beetle, *Macrodactylus subspinosus*; the Indian Cetonia, *Euphoria Inda*; the asparagus beetle, *Crioceris asparagi*; the punctured clover-leaf weevil, *Phytonomus punctatus*; and the sculptured corn-curculio, *Sphenophorus sculptilis*.

Injurious insects belonging to the order Hemiptera next claim attention, when the life histories of the harlequin cabbage-bug, *Murantia histrionica*; the four-lined leaf-bug, *Pæcilocapsus lineatus*, and the two-marked tree-hopper, *Enchenopa binotata*, are given. Throughout the whole of this valuable report the species referred to are freely illustrated with excellent figures, and the text conveniently arranged in separate paragraphs with suitable headings.

The report closes with an Appendix, which contains a full account of

the entomological writings of the late Dr. Asa Fitch, a list of the insect enemies of the apple-tree, descriptions and notes of Lepidoptera, on the life duration of the moths, followed by a very complete general index covering 33 pages, with an additional index to food plants. We have had many excellent reports from State Entomologists in the past, but we doubt if ever there was a report published containing so much useful information and so well arranged in every respect as this first report of Prof. Lintner's. The State of New York may well be congratulated in having secured the services of an officer so efficient and painstaking.

Twelfth Report of the State Entomologist on the Noxious and Beneficial Insects of the State of Illinois.

This twelfth Illinois report is the first of the recently appointed State Entomologist, Prof. S. A. Forbes. It is a large octavo pamphlet of 162 pages, illustrated with 30 cuts. An exhaustive account is given of the corn-root worm, *Diabrotica longicornis*, Say, with magnified figures of the insect in all its stages, together with details of the injury it has inflicted. This is followed with an account of the remedies, both natural and artificial, which have been found useful in subduing this pest. The Chinch bug, *Bassus leucopterus*, is next noticed, its life history given, and natural enemies enumerated, including a species of bacterium, *Micrococcus insectorum*, which has been found destructive to the Chinch bug in the west.

The strawberry crown borer, *Tyloderma fragaria*, is described very fully, and its work illustrated; also the crown miner, *Anarsia lineatella*. Following these are descriptions of the melon plant louse, *Aphis cucumeris*, n. sp., which has been found injuring cucumbers and melons; the European cabbage worm, *Pieris rapae*, with details of experiments with various remedies. The cherry or pear slug, *Selandria cerasi*; the white-marked tussock caterpillar, *Orgyia leucostigma*, the bag-worm, *Thyridopteryx ephemeraeformis*; the army worm, *Leucania unipuncta*; the stalk-borer, *Gortyna nitela*; and the zebra caterpillar, *Mamestra picta*, are also described, following which is an interesting article on the food relations of predaceous beetles, a subject to which Prof. Forbes has devoted much attention. Next in order is a paper on the Phytopti and other injurious plant mites, by H. Garman, and observations on the angoumois grain moth and its parasites, by F. M. Webster; the whole forming an excellent report, one which well sustains the character to which the Illinois reports have attained.

The Canadian Entomologist.

VOL. XV. LONDON, ONT., DECEMBER, 1883.

No. 12

LIST OF DIURNAL LEPIDOPTERA COLLECTED IN THE NORTH-WEST TERRITORY AND THE ROCKY MOUNTAINS.

BY CAPTAIN GAMBLE GEDDES,

A. D. C. to the Lieut.-Governor of Ontario, during Season of 1883, with Localities.

1. *Papilio Asterias*, F. Edmonton.
2. " *Troilus*, L. Fort Macleod.
3. " *Turnus*, L. "
4. " *Glaucus*, L. "
5. " *Eurymedon*, Bd. Seen but not taken.
6. *Parnassius Smintheus*, Doubd. Crow's Nest Pass.
7. Dark var. *Hermodur*, H. Edw. Summit Pass.
8. *Pieris Oleracea*, Boisd. Koutanai.
9. " *Occidentalis*, Reak. Pincher Creek.
10. " *Protodice*, Boisd. Belly River.
11. " *Rapæ*, L. N. W. T.
12. *Anthocaris Olympia*, Edw. (v. rare). Summit.
13. " *Ausonides*, Boisd. Calgary.
14. *Colias Christina*, Edw. Red Deer River.
15. " *Occidentalis*, Scud. (rare). Edmonton.
16. " *Edwardsii*, Behr. (rare). Edmonton.
17. " *Astrea*, Edw. (♀ new). Red Deer River.
18. " *Alexandra*, Edw. (rare). 5,000 ft. elevation Rocky Mountains.
19. " *Eurytheme*, Boisd. (rare). None taken W. of Moose Jaw.
20. " *Hagenü*, Edw. Fort Macleod.
21. " " " (diminutive form). Fort Macleod.
22. " *Scudderii*, Reak. Koutanai.

23. *Argynnis* Lais, N. S., Edw. Fort Edmonton.
24. " *Cybele*, F. "
25. " *Baucis*, Edw. (not proved new yet). Fort Edmonton.
26. " *Coronis*, Behr. Belly River.
27. " " (dark varieties). Crow's Nest.
28. " *Chariclea*, Schneid. Crow's Nest.
29. " *Boisduvalii*. "
30. " *Atlantis*, Edw. "
31. " *Eurynome*, Edw. Belly River.
32. " *V. Erinna*. Red Deer River.
33. " *V. Arge* (?), Streck. Calgary.
34. " *Clio*, Edw. (v. rare). Crow's Nest.
35. " *Monticola*, Behr. (v. rare). Summit.
36. " *Edwardsii*, Reak. (v. rare). Blackfoot Reserve.
37. " *Artonis*, Edw. (v. rare). Koutanai.
38. " *Myrina*, Cram. Edmonton.
39. " *Aphrodite*, F. "
40. *Melitæa* *Nubigena*, Behr. Crow's Nest.
41. " *Palla* (?), Boisd. "
42. " *Chalcedon* (?), Boisd. Garnett Ranche.
43. " *Leanira*. " "
44. *Limenitis* *Disippus*, Godt. Crow's Nest.
45. " *Lorquini*, Boisd. "
46. " *Arthemis*, Drury. N. W. T.
47. *Vanessa* *Milberti*, Godt. N. W. T.
48. " *Antiopa*, L. N. W. T.
49. *Pyrameis* *Atalanta*, L. N. W. T.
50. *Grapta* *Satyrus*, Edw. Crow's Nest.
51. " *Progne*, Cram. Fort Macleod.
52. *Danaïs* *Archippus*, F. Common.
53. *Chionobas* *Chryxus*, West (v. rare). Summit.
54. " *Varuna*, Edw. Calgary.
55. " *Uhleri* (?), Reak. "
56. *Erebia* *Epipsodea*, Butl. Fort Ellis.
57. *Satyrus* *Charon*, Edw. Garnett Ranche.
58. " *Silvestris*, Edw. "
59. " *Nephele*, Kirby. Rocky Mountains.
60. " *V. Boopis*, Behr. "

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61. " V. Ariana, Boisd. Rocky Mountains.
 62. " V. Olympus, Edw. "
 63. *Cænonympha Inornata*, Edw. Calgary and Edmonton.
 64. " *Ochracea*, Edw. "
 65. *Phyciodes Carlota*, Reak. Brandon.
 66. " *Tharos*, Drury. Edmonton.
 67-68. Several varieties from North of Edmonton. Not determined.
 69. *Thecla Titus*, F. Old Man's River.
 70. " *Edwardsii*, Saund. (rare). Summit.
 71. *Chrysophanus Mariposa*, Reak. (v. rare). Summit.
 72. " *Florus*, Edw., Nov. Spec. (v. rare). Garnett's Ranche.
 73. " *Helloides*, Boisd. Oxley Ranche.
 74. " *Americana*, D'Urban. "
 75. " *Sirius*, Edw. (v. rare). Fort Macleod.
 76. *Pyrgus Tessellata*, Scud. Medicine Hat.
 77. *Amblyscirtes Vialis*, Edw. (v. rare). Fort Ellis.
 78. *Thymelicus Garita*, Reak. Fort Ellis.
 79. *Thanaos Brizo*, Boisd. Fort Ellis.
 80. *Eudamus Pylades*, Scud. "
 81. *Lycæna Anna*, Edw. Belly River.
 82. " *Amyntula*, Boisd. Calgary.
 83. " *Sæpiolus*, Boisd. Crow's Nest.
 84. " *Rustica*. Fort Qu'Appelle.
 85. " *Pembina*, Edw. Crow's Nest.
 86. " *Afra*, Edw. Nov. Spec. Saskatchewan.
 87. " Unknown Spec. sent for identification. Garnett Ranche.
 88. *Pamphila Zabulon*, Bd. Lec. Calgary.
 89. " *Manataaquæ*, Scud. (v. rare). Fort Macleod.
 90. " *Manitoba*. Belly River.
 91. " *Uncas*, Edw. "
 92. " *Cernes*, Bd. Lec. Crow's Nest.
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INSECTS AS FOOD FOR MAN.—In the interior of Australia the natives are very fond of a large Coleopterous larva found in the bark of certain species of *Eucalyptus*. They eat them generally raw, holding them by the head and biting the body off as we would a cherry. They also cook them in the hot ashes and eat them.—*American Naturalist*.

HISTORY OF THE PREPARATORY STAGES OF COLIAS
EURYDICE, BOISD., WITH REMARKS UPON THE
GENUS MEGONOSTOMA, REAKIRT.

BY W. H. EDWARDS, COALBURGH, W. VA.

EGG.—Shape of *Eurytheme*, fusiform, tapering evenly from the middle to either extremity; the base broad, the summit pointed, ribbed longitudinally, and crossed by numerous striæ; color, pale green when first laid; later, changing to crimson; duration of this stage about four days.

YOUNG LARVA.—Length, .1 inch; cylindrical, thickest on two and three, tapering slightly to thirteen; each segment from two to thirteen several times creased, and on the ridges thus caused are many fine black points, each with minute black hair; scattered among these are larger black points, or tubercles, some with long, tapering, black hairs, but most with long, white, clubbed appendages; on two there is a cross row of these in front of the segment, five on either side, running from dorsum to base; on three and four are four each, also in front, but after four, there are three to the segment, disposed in triangle, two being in front, one on the last ridge; these form longitudinal rows; thirteen has three black hairs on either side in triangle, and from four to twelve are two black hairs at base of each; color, dull yellow-green; feet and legs same; head rounded, but little depressed at top; a few tubercles scattered over the face, each with long, tapering, depressed, black hair; color, pale yellow-brown. Duration of this stage about four days.

After first moult:—Length, .14 inch; color, yellow-green; the ridges thickly beset with black points, from which black hairs; on two, three and four these points are larger than elsewhere; head shaped as before, the depression being decided; the tubercles and hairs more frequent; color, yellow-green, paler than body. As the stage proceeds, a yellow stripe begins to show itself the length of body, below spiracles. To next moult four to five days.

After second moult:—Length, .22 inch; color, green, with black points and hairs as in previous stage; the band along base distinct, white; just over it, on three and four each, on the middle of the segment, is a black bead-like process; under side, blue-green; head, yellow-green; thickly covered with fine black tubercles, each with a short, black hair, and among them are about twelve of considerably larger size, with long hairs. To next moult three days.

After third moult:—Length, .4 inch; color, same; in addition to the black processes on three and four is often a minute similar one on the succeeding segments in same line, but there is much variation as to these in number; the band white, with a yellow discoloration, which shows more decidedly as the stage progresses. To next moult three days.

After fourth moult:—Length, .6 inch; the red begins to show in the band for the first time, and there is quite constantly a black process on the segments after four, as described in previous stage. To maturity three days.

MATURE LARVA.—Length, 1.1 inch; cylindrical; color, dull green; the segments thickly covered with fine black tubercles, each of which gives out a short, black hair; along base, lying in line with the spiracles, from two to twelve inclusive, is a narrow, white band, and along the lower edge of this is a macular vermilion streak, broken at the junctions of the segments; on three and four each, over the band, in middle of the segments, is a black, vitreous, rounded process, and sometimes minute ones of same character are found on the succeeding segments, or part of them; under side blue-green; legs and feet same; head, color of body, rounded, slightly depressed at top, thickly beset with fine, black points, each with short, black hairs; ocelli, black. From fourth moult to pupation six days. One larva at the last stage differed from all the rest; in addition to the complete row of vitreous spots, it had others on certain segments, viz.:—on two, one at verge of dorsum on either side; on three, three high up on either side; on four, two high up; on five and six, one sub-dorsal each; on eight and ten, each, an abbreviated jet-black bar, instead of round processes; and below the white band were small, black marks, such as are seen in many *Philodice* and *Eurytheme*.

Another had on each segment, from two to thirteen inclusive, on the second ridge from the point, a black band from the white band on one side to that on the other; these had the sides more or less crossed, but were pretty regular; on thirteen was a short black bar along each side, and the shield was black. This was a remarkable variation.

[NOTE.—All the larval measurements and descriptions above given were taken at or near twelve hours from the moult.]

CHRYsalis.—Length, .8 inch; greatest breadth across mesonotum, .19; across abdomen, .2 inch; greatest depth, .28 inch; compressed laterally, the abdomen conical, the head case produced to a point; the thorax on ventral side prominent and compressed to a narrow ridge; the mesono-

tum low, rounded, with a slight carina, and followed by a slight excavation; color, apple-green; a white stripe along side of abdomen to extremity. Duration of this stage nine to ten days.

Boisduval's type male is described as having the yellow replaced by vivid orange, and the fore wings as having a violet reflection. This is the form figured in But., N. A., Vol. I. But many are utterly without any sort of reflection, and the dog's head is ochre-yellow.

Mr. Henry Edwards, in Proc. Cal. Acad., Dec. 18, 1876, called attention to the var. *Amorphe* of *Eurydice*, and speaks of it as the autumn brood of *Eurydice*, distinguished by a decided black marginal border to hind wings of the male, and by brown patches upon the marginal border of the female. It is a seasonally dimorphic form rather than a variety. Mr. Edwards discovered that *Amorpha Californica* was the food plant of *Eurydice*, and described some part of the transformations in Proc. before cited, June 5, 1876. He notices that the caterpillar refused all other plants offered by him. The mature larva and chrysalis are described. I see that Mr. Edwards gives the length of the larva as 1.45 inch, and of the chrysalis .95 inch. The largest larva which I have seen had a length of only 1.1 inch, and the chrysalis of .8 inch. It may be that the larva of spring brood is smaller than the fall brood. All my larvæ were of the spring. Mr. W. G. Wright, of San Bernardino, sent me several eggs by mail, which hatched on the road, and the larvæ reached Coalburgh 2nd April, 1883. On 23rd April, I received quite a number of larvæ of all stages from first to last; 24th April, came another lot of larvæ. With each lot came a supply of the food plant, and boxes of this were sent me repeatedly, and till I announced that I wanted no more; also plants with roots were sent, and these I succeeded in saving, and before fall had three large bushes four feet high. I tried, in vain, to make the larvæ eat clover. Their habits are similar to those of *Philodice*. When first hatched, they eat furrows in the surface of the leaf; by first moult eat the leaf itself; always lie extended on the upper side along the mid rib. There is not the slightest difficulty in raising them to chrysalis, if one has the plant.

The several stages of this butterfly—egg, larva from egg to pupa, and the pupa, are closely like those of other Coliads, as *Philodice*, *Eurytheme*, &c. There is no generic difference whatever observable in any of these stages between *Eurydice* and *Philodice*, and so far as my observations with Diurnal

Lepidoptera go, there is no case where a natural genus does not show its distinctive characters in the preparatory stages, either in all of them, or part. There is no more natural genus than *Colias*, and it seems to me enough that the differences in the imagos should be indicated by groups merely. A group may stand for a sub-genus, but the differences in *Colias* are hardly enough to make sub-genus of. Therefore, I do not approve of the genus *Megonostoma*, created by Reakirt in 1863 to accommodate *Eurydice* and *Cæsonia*, and a supposed species called by Mr. Reakirt *Helena*, but which is a variety of one of the others. Mr. Reakirt was, at that date, a zealous collector, but, like myself, was but a beginner, and undertook to generalize in this case on very slight grounds. His most important character for the new genus consisted "in peculiar appendages, found on the middle and posterior legs of the female," to which he gives the name *Eupronychia*. "To be found on the under side of the tarsi, respectively, at two-thirds and three-fourths of their length, as two small membraneous appendages, each being tri-jointed." And nearly a whole page of the Proc. Ent. Soc., Phil., Vol. II., is devoted to a description and elaborate measurements of those appendages, running into the hundred thousandths of a millimeter. Now, I never was able to find in any example of *Cæsonia* or *Eurydice* any such appendages, and I recollect very well that at the time this genus was made known, another lepidopterist said the appendages were merely spiculæ from some flower, probably of *Asclepias*. Recently I made a fresh examination and have found nothing, though I have a great many females of these species to make examination of. Desiring the observations of some one besides myself, I wrote Mr. E. M. Aaron, at Phil., asking him to subject examples to the action of a powerful microscope. He replied: "After a careful examination of a number of specimens, I fail to find anything that will answer to Reakirt's *Eupronychia*. It would seem that this characteristic is worthless, at least. The microscope used is a most powerful one." In the other characters cited by Mr. Reakirt—as eyes, oval, projecting, &c., &c.—there is nowhere a generic distinction. *Eurydice* and *Cæsonia* have falcate fore wings, but that is not a generic difference, else *Papilio Rutulus* would have to be separated from *P. Turnus*. Between the imagos of these two species and *Eurytheme* and *Philodice* are resemblances which bind them closely together, and which can have come only from a common ancestor: as the discal spots, the sub-marginal points on under side, the spots at base of hind wings, and the patches at outer

angles. So the noted "dog's head" breaks out now and then in both the species named.

I think, therefore, that the genus *Megonostoma* should be dropped from circulation, for there certainly is no more to justify a separate genus for these two species than there is for *Edusa* or for *Behrii*.

NOTES ON SOLPUGIDÆ.

AY W. G. WRIGHT, SAN BERNARDINO, CAL.

My first *Solpuga* was found under a clod of hard earth, which I overturned in search of spiders. Upon being uncovered, it reared its palpi aloft with a menacing motion, and backing down as closely as possible into a little depression, stood motionless till captured. This was in August, 1882. The specimen is apparently a ♀, *Datrines constricta*, of medium size. The head and mandibles conform closely to the figure of that species, but it differs materially from the letter-press description of *Constricta*; as to the other parts.

The second individual was taken in the evening, after a favorable opportunity for observing its motions. It was in May, 1883, at 9 or 10 o'clock, as I was sitting at my work-table writing a letter. A shaded lamp threw a strong light down upon pen and paper. For a few moments I had sat still, elaborating a sentence in my mind, when a magnificent *Datrines* came up from under my left arm as the elbow was extended after usual fashion, and ran with rapidity across the paper upon which I was writing, to the cover of some loose papers two feet to the right. As it ran I distinctly saw its motions. The body was nearly or quite dragging, and its palpi were raised up and curved forwards, and were in rapid motion, evidently as antennæ or feelers, and not from fear or as a menace. Immediately recognizing my visitor, I hastily got the alcohol bottle and soon dislodged the animal from the papers, when it ran, with the same motions as previously, to regain its old hiding-place under the table, almost re-passing over its previous track; and as it dropped over the edge of the table, by good fortune it fell into the bottle.

This, larger one, is evidently a *Datrines*, but is unlike any plate or description seen by me. It is much larger than *D. constricta*, but, like it, is also a ♀.

From what I saw of these two individuals, I do not think them belligerent, nor that they would willingly bite or attack anything except their natural prey. Rather, I regard them as extremely timid things, and think that their so-called belligerent attitudes are in defence, or from the same feeling, whatever it may be called, that prompts a hare or a sheep to stamp upon the ground when it sees something that it does not understand.

POLENTA, SCOLECOCAMPA AND EUCALYPTERA.

BY ^{REV.}JOHN B. SMITH, BROOKLYN, N. Y.

In my synopsis of the genera of the *Noctuidæ* I placed *Polenta*, Morr., in a section with the anterior tibia unarmed at tip, and *Eucalyptera*, Morr., I retained as distinct from *Scolecocampa*, Gn., the genera coming into different sections by the form of the palpi, and no particular comparisons being made, because I considered the genera so widely distinct that there was no possible chance of confounding them. On this account I have been criticised by Mr. Grote, and attention has been called in the case of *Polenta* to the fact that a specimen in Mr. Neumoegen's collection had a claw terminating the anterior tibia, and that, therefore, I had inexcusably overlooked an important and obvious structural character. With all due deference to Mr. Grote, I think the mistake is not on my side; of *Polenta* I saw Mr. Morrison's type and three other specimens; these I carefully re-examined, after reading Mr. Grote's strictures, and *not a single one of the specimens has any trace of armature at the tip of the anterior tibia.* That Mr. Grote has seen a claw terminating the anterior tibia of an insect labelled *Polenta Tepperi*, Morr., it would be folly for me to dispute. That the insect is correctly determined I may be permitted to doubt, for it is scarcely possible that on all of the specimens I have examined the claw was so broken off as to leave no trace. I believe, therefore, that I was right, and that Mr. Morrison's generic diagnosis in this particular was correct.

As to *Eucalyptera* Mr. Grote fails to see any reason whatever for "re-habilitating" this genus. I have the type of *Eucalyptera* and three other specimens, agreeing in all respects with it: and *Scolecocampa* is

so well known that it will scarcely be contended that I have mistaken the insect. I give in parallel columns the generic diagnosis of each :

SCOLECOCAMPA.

Form robust, strong ; eyes naked ; tibiæ unarmed ; legs moderate, strong, densely clothed with long hair, forming tufts in the ♂.

Tongue moderate, spiral ; front not globose, with a pointed tuft directed *downward* ; palpi *straight*, projecting far beyond the head, rather roughly clothed, the second joint longest, much enlarged and more heavily clothed at tip, the terminal joint drooping ; the whole, with the frontal tuft, forming a pointed snout.

The species *bipuncta* has a very close resemblance, structurally and superficially, with *Doryodes acutaria*, and, like it, is found in salt marshes. I certainly cannot be accused of an overfondness for numerous genera, but I do most firmly believe that *Eucalyptera* and *Scolecocampa* can *not* be properly united.

EUCALYPTERA.

Form slender, slight ; eyes naked ; tibiæ unarmed ; legs long, slender, closely scaled, anterior coxæ unusually large.

Tongue rudimentary, obsolete ; front globose, with a pointed tuft directed *upward* ; palpi *oblique*, moderately exceeding the head, closely scaled except at tip of second joint, where a tuft of scales creates an apparent enlargement ; terminal joint, straight, the whole forming a pointed snout, but projecting upward as well as forward.

TO ENTOMOLOGISTS.

Dr. H. A. Hagen, of Cambridge, Mass., is working on a monograph of the Odonata, with special regard to their early stages. He will be thankful to receive material from any collector who may have such, and will duly acknowledge the same. Larvæ or pupæ (dry or in alcohol) will be valuable to him, but he especially desires reared specimens of the insects, with such notes as can be furnished of the earlier stages. We trust that all who can will assist this distinguished author, who has done so much to aid others in their entomological studies.

ENTOMOLOGY FOR BEGINNERS.

*THE PROMETHEA EMPEROR-MOTH.**Callosamia Promethea*, DRURY.

BY THE EDITOR.

In Fig. 10 we have a faithful representation of the male of this beautiful insect, and in Fig. 11 the female is shown. Both of these were drawn from

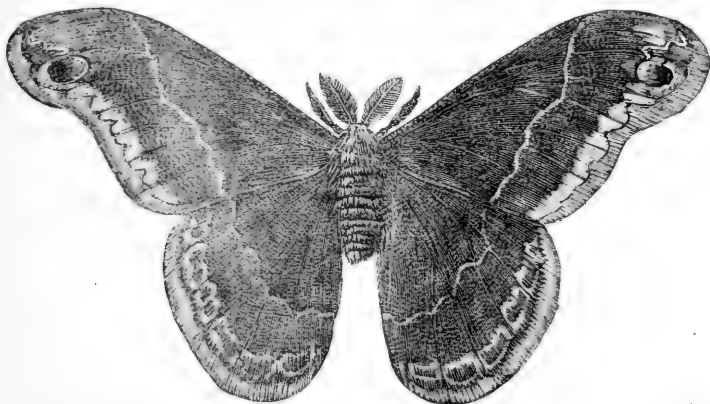


FIG. 10.—MALE.

nature, and engraved by H. H. Nichol, of Washington, and are of the

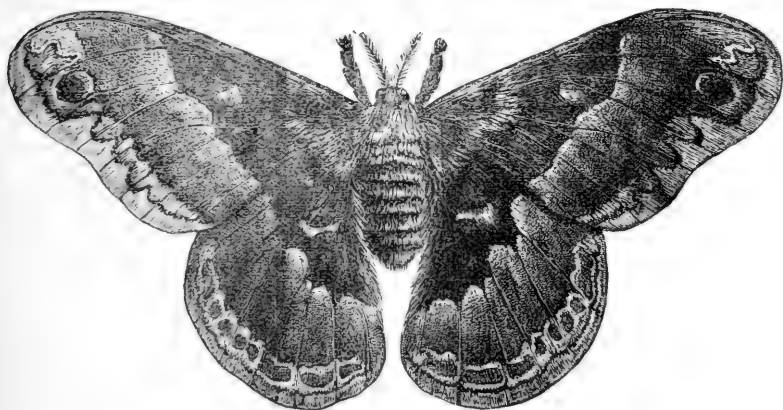


FIG. 11.—FEMALE.

natural size. This species is found throughout most of the Northern States and in Ontario, appearing on the wing late in June or early

in July. The wings of the male are of a brownish-black color, those of the female light reddish-brown. In both sexes the wings are crossed by a wavy whitish line near the middle, and a yellowish border along the hinder edges. They both also have an eye-like black spot with a pale bluish crescent within, near the tip of the fore wings. Near the middle of each of the wings of the female there is an angular reddish-white spot, margined with black; these are also visible on the under side of the wings of the male, but are seldom seen on the upper side. The wings of the male are narrower than those of the female, and the antennæ much broader.

The female lays her eggs in clusters of five or six or more together. They are of a creamy-white color, with an ochreous spot on the upper side, and are about one-sixteenth of an inch in diameter. They hatch towards the end of July.

The young larva is pale green with yellow bands and faint rows of black tubercles. After passing the second moult it appears as at *a* in Fig. 12. During the subsequent moults the larva changes very much, and when full grown it measures two inches or more in length, and presents the appearance shown at *b* in the figure. It is then of a bluish-green, or sometimes of a greenish-yellow color, with a whitish bloom, and has the head, feet, and hinder segments yellow. On each segment there are about eight small warts or short horns of a deep blue color, except the two uppermost on the top of the third and fourth rings, which are of a rich coral

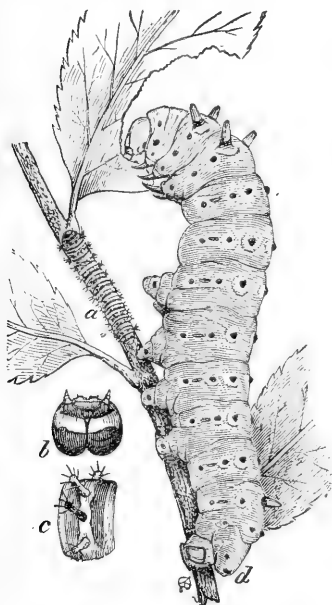


FIG. 12.—After Riley.

red, and a long yellow one on the top of the twelfth segment.

When full grown it selects a suitable spot from which to suspend its cocoon, usually a twig of cherry, sassafras, or some other tree, on which the larva feeds. The twig is first wound round with silk for about half an inch on each side of the base of a leaf; the silk is then spun down around the leaf stalk, so that the leaf is firmly fastened to the twig, and cannot be detached without using much force. The expanded leaf is then drawn

together with silken threads in the form shown in Fig. 13, and within this enclosure the cocoon is spun. These cocoons may often be seen during the winter hanging from the twigs of trees and shrubs.

In addition to the cherry and sassafras, the larva feeds on ash, poplar, azalea, button bush, and other shrubs and trees; although the ash is a very common food plant the cocoons are rarely, if ever, found upon it. The leafstalks being very long, it is perhaps too laborious a task for the caterpillar to fasten them to the twigs, and hence it leaves them in search of leaves with shorter stalks.

Birds frequently devour the contents of these cocoons during the winter, perforating them with their beaks; the insect is also liable to be attacked by Ichneumon flies, which live in the larval state within the bodies of their victims and consume them.

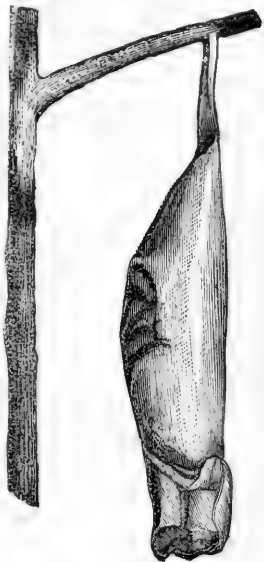


FIG. 13.—After Riley.

A DISTINGUISHED HONOR.

We are much gratified to learn that at the annual convocation of Trinity College, Toronto, held on the 15th of November, the distinguished title of D. C. L. (Doctor of Civil Laws) was conferred upon the Rev. C. J. S. Bethune, M. A., head master of Trinity College School, Port Hope, Ontario. This is the highest title Trinity College can confer, and it is the first time it has been bestowed upon one of its own Bachelors. Mr. Bethune's career as an entomologist is so well known that it is perhaps scarcely necessary to remark that he is one of the most prominent of Canadian Entomologists; was formerly editor of this Journal, has been from the outset one of the pillars of our society, and has done much to advance Entomology in this country. Many we know will rejoice with us that Mr. Bethune has been made the recipient of this well-merited honor.

BURNING OF THE SOUTHERN ILLINOIS NORMAL UNIVERSITY AT CARBONDALE, ILL.

On the afternoon of November 26, a fire was discovered in the south-east portion of this structure, directly above the museum, which spread rapidly, and in a short time consumed the entire frame-work of the building, leaving only the bare and blackened walls standing. The loss is estimated at \$150,000. The greater portion of the library, apparatus, and furniture was saved, but the valuable museum, with all its contents, was destroyed, including large collections of insects, birds, plants and shells. By this fire there have been lost the type specimens of a number of species of Orthoptera and Hymenoptera, besides a large number of fine examples of insects of all orders. Fortunately there were 22 drawers of the 72 in the insect cabinet down stairs in Prof. French's room; these were saved, together with about fifty smaller boxes partly filled. The types also of the new species of Diptera, recently described by Mr. Marten in the CAN. ENT., were saved. The earnest workers in this institution have our sincere sympathy in the disaster which has befallen them. We trust that the enterprise so characteristic of Western people will be equal to the occasion, and that the University will be promptly rebuilt.

EGG AND YOUNG LARVA OF PAPILIO CRESPHONTES.

BY THE EDITOR.

On the 2nd of September I observed a number of young larvæ of *P. cresphontes* on the leaves of a small bush of prickly ash, *Xanthoxylum fraxincum*, and among them some eggs, unhatched. The eggs were laid singly and usually on the upper side of the leaf, to which they were firmly attached. They were about one-twentieth of an inch in diameter, nearly round, slightly flattened, and concave at the base at the point of attachment to the leaf; color pale yellow; not reticulated; almost smooth, with a few irregular yellow dots and patches, as if yellow mucus had been dropped on the surface and dried. The eggs were semi-transparent portions of the young larva, with the black hairs which adorn it showing through. The young larvæ varied from a quarter to half an inch in length. They were black, with an irregular pale patch almost covering

the seventh and eighth segments, and another on the two hindmost segments. Each segment was adorned with semi-transparent tubercles, which were pale on the pale patches and dark on the other portions of the body; each tubercle was armed with a few short black spines. On each side of second segment is a prominent tubercle with two smaller ones between them; the third, fourth and fifth segments have six tubercles on each, arranged in irregular transverse rows; the remaining segments have only two tubercles. Body thickest towards the front, tapering behind.

MOTHS INJURIOUS TO VEGETATION.

BY A. R. GROTE, A. M.

Under this head one might arrange nearly the whole of our moths, except, perhaps, a little species, the *Eusephora coccidivora*, which Professor Comstock has discovered to be predaceous, and to live upon plant-lice in the larval state, and one or two others, which, perhaps, have similar habits. A good many species become unusually numerous, however, in certain years and localities. Almost always this seems to be owing to the temporary cessation of action of the checks which keep down species from excessive multiplication, and disturbing the order of things. When we cultivate a large quantity of any cereal or plant of economic value, we in effect afford abundant food for the insects which habitually infest it. Many will recollect that the maple and other shade trees in Brooklyn and New York used to be completely defoliated by the middle of summer by the common Brown Drop or Measuring Worm, *Eudalimia subsignaria*. The English sparrow rid us of this nuisance; it eat every one of them. This Measuring Worm sought refuge in the cities from the birds which attacked it, and kept it down in the country. In the cities the birds were less plentiful and, this check being removed, they thrived exceedingly. When the Measuring Worms were gone their place was taken by a different moth, the Gray Vaporier, *Orgyia leucostigma*, whose caterpillars, being hairy, were unpalatable to the sparrows. In Philadelphia this substitution merely exchanged one nuisance for another, so plentiful have the Vaporier caterpillars become. In Buffalo, where the Vaporier was always the prevailing pest, no change has been made upon the entry of

the English sparrow into that city. Other species occasionally increase largely in certain seasons for some unknown cause. On Mount Desert one season I saw myriads of the Pretty Pine Spanner, *Cleora pulchra*, which is not usually so plentiful. Some of the principal species which injure our cultivated plants are the Army Worm, *Heliophila unipuncta*; the Cotton Worm, *Alctia argillacea*; the Cabbage Cut-worm, *Hadena devastatrix*, and other Cut-worms belonging to the genera *Agrotis* and *Hadena*. The pine trees are bored by the larvæ of several moths, and so with the hickories, as well as the fruit trees in our orchards. Some excellent scientific work towards working out the natural history of all these species has been done by the Department of Agriculture at Washington and the various State Governments. Taking into consideration the damage inflicted by these insects, it may be said that money is well spent towards understanding all about these pests, and the way to abate them is to understand their histories and modes of attack first. The fact remains that in many instances we can do comparatively little to check the ravages of insect pest; we have them chiefly removed by the multiplication of their natural enemies.

CORRESPONDENCE.

COAL TAR FOR THE PLUM WEEVIL.

Dear Sir,—Respecting the use of coal-tar in the matter of driving away the plum-weevil about which Prof. Claypole inquires (p. 180), I have seen it recommended several times, and perhaps the source of the different commendations of it was Prof. Alex. Winchell's paper. I have tried the coal-tar and found it of no avail. Some have followed advice published at one time, and applied the tar directly to the bark of the trunk and branches and thereby destroying the life of the tree, as has also been done with carbolic acid. All similar ways of fighting the plum-weevil must be classed as *parrying* methods. Systems aiming at wholesale slaughter, permit me to say, I deem are more judicious. There are at least two very reliable *exterminating* methods in use against the pest, both of which are explained by Mr. B. Gott in his article on the "Plum Curculio," in Annual Report of Entomological Society of Ontario, 1879.

Very respectfully yours,

Clyde, N. Y.

W. L. DEVEREAUX.

PIERIS RAPÆ VAR. NOVANGLIÆ.

Dear Sir,—In the CANADIAN ENTOMOLOGIST, Vol. iv., p. 79, Mr. Scudder describes a variety of *Pieris rapæ* under the name of *Novangliæ*, and indicates that it is a new variety, developed since the introduction of this species into America. He gives Mr. Stainton as authority that nothing of the kind occurs in Europe. Curtis, in his "Farm Insects of Great Britain," page 101, after describing *Rapæ*, says: "But I possess a male, taken near Oldham, in Lancashire, which has all the wings of a bright yellow color." Is not this Mr. Scudder's variety *Novangliæ*? If so, the origin of it must be placed further off than since the introduction of the species into this country, and the cause of its development, something operating in England as well as in New England. Yours truly,

State College, Orono, Me., Dec. 20, 1883.

C. H. FERNALD.

PARASITE ON VANESSA ANTIOPA.

Dear Sir,—In the ENTOMOLOGIST for September, your correspondent, Frederick Clarkson, speaks of obtaining so few parasitic insects from various cocoons. Perhaps it may interest some of your readers if I mention some cases of an opposite character that have come under my own observation. From a chrysalis of *V. Antiopa* I counted 145 little green flies, and from the cocoon of a curious green and white worm, of which I have not been able to find the name, I *carefully* counted 1,257 very small black flies. This cocoon was not as large as *V. Antiopa* chrysalis. You see I am not scientific enough to know the names of these parasites, but I send the facts for what they are worth. Yours truly,

Watertown, N. Y., Nov. 8, 1883.

HARRIET H. KEYES.

REMARKABLE GATHERING OF BEETLES.

Dear Sir,—On the 10th of October last, while walking along the new dock, now in course of construction at Weller's Bay, I noticed what seems to me a remarkable occurrence, and one which I should like to know if others have observed. Along the outer edge of the crib-work were thousands of beetles, which were so thickly collected together in some places that a spot the size of one's hand would have on it from 30 to 40 insects; they were chiefly *Coccinellidæ*, but among them were *Carabidæ*, *Chrysomelidæ*, *Staphylinidæ*, and other families. In the course of a few minutes I picked up, besides specimens of many other species, no less than 55 *Donacias*.

At the time there was a strong southerly breeze blowing off the water, to which they were fully exposed. They were clinging to lumps of moist sandy mud, which had been recently dredged for filling the crib, and to moistened wood-work. No attempt was made at flight while being picked up. On the inner edge, or land side of the crib, not one was to be seen.

JOHN D. EVANS, Trenton, Ont.

NOTES ON THE LARVÆ ON SOME SPHINGIDÆ.

Dear Sir,—In looking over your Entomological Report for 1881, I find, among the descriptions of the larvæ, pupæ and imago, the following about the larva of *Hemaris tenuis*, Gr.: "The larva is, we believe, at present unknown." I have collected and reared this same larva for the last four or five years, and found it plentiful, feeding on the snowberry, *Symphoricarpos*, of which I have noticed, I believe, two varieties or species: one with small, almost round leaves, the other, which seems very rare, with larger leaves and more pointed. Having believed this larva to be fully described, I took no pains to make notes of its color or characteristics, and could not now furnish a description of it. I have a number of pupæ of this species. I also found two sphinx larvæ this season, of which I have not yet seen a published description. Being much occupied at the time I was feeding these, I put off making notes until one day when I was at leisure, then I found it was too late, as they had entered the ground. One I took feeding on Privet *Ligustrum*; it had the general appearance of *Sphinx drupiferarum* in size and color, only that the oblique lines were light yellow, almost white, with a broad band nearly an eighth of an inch wide of a beautiful dark ultramarine blue; caudal horn light bluish-green, ending in a horny brown point, heavily granulated with black. The other larva I found on black ash and on the fringe tree, of which we have several fine specimens in the city park; on these latter I also found feeding *S. chersis*, which much resembled this one. *Chersis* differs in that it tapers slightly towards the head; the stigmata are white in the centre, surrounded with bright red, and the caudal horn is but lightly granulated with black. Pupæ without tongue case; of a coffee-brown color, whilst in the former it is almost black. Both larvæ fed readily on black ash in my garden. *H. tenuis* I have never found feeding on any other than the above mentioned shrubs. I also found a third larva feeding in company with *H. thysbe*, much resembling *D. myron*, on *Viburnum dentatum*, the pupæ of which is a light grayish tan color, with the markings of a *Darapsa*. PH. FISCHER, 528 High St., Buffalo, N. Y.

VARIATIONS IN MARKINGS OF CICINDELA SEX-QUITTATA.

Dear Sir,—I have just read with much interest Mr. Townsend's article (Vol. xv. p. 205-8) "On the variation of the elytral markings of *Cicindela sex-quittata*," and as he quotes from my field notes for 1881, I feel called upon to modify the record therein made casually of a two-spotted variety of this beetle. A more careful examination shows that, in addition to the anterior spots of normal size, rudimentary posterior ones may be discerned with a good glass, or more plainly, as Mr. Townsend points out, by examining the under surface. I can discover no trace, however, of the intermediate spots. The specimen is apparently a variation in the direction of the immaculate southern variety known as *Violacea*, Fab., towards which it also tends in coloration. I may add that of eighteen other specimens at present all in my collection (and taken promiscuously), five belong to the first variety and five to the third; one of the latter showing an interrupted line from the anterior to the inner spot, and having the posterior ones rudimentary. Three belong to the fifth variety; one of these has also an interrupted line from anterior to inner. The remaining specimen belongs to the the seventh variety. Other interesting varieties probably occur; and as the beetles are very common here, I will endeavor next season to obtain a more extended series. The color of many specimens also departs very much from the typical green toward a decided blue.

W. HAGUE HARRINGTON, Ottawa, Ont.

ON THE GENUS IDIOSTOMA.

Dear Sir,—I have seen in the July number of your valued periodical (Vol. xv., p. 139) in a letter from my esteemed correspondent, Miss Murtfeldt, the confession which she has kindly made public on my behalf of my oversight in characterizing the genus *Idiostoma* as new to science, whereas it had been already described by Messrs. Grey and Boll under the name "Metamorpha." When I first received an example of this genus from South Africa, I had not seen the original description, nor should I have expected to find it among North American genera. I make no excuses for the mistake: but as the name *Metamorpha* is pre-occupied, having been used by Hubner for another genus of Lepidoptera, I venture to point out that, according to the accepted rules of Zoological nomenclature, the name "*Idiostoma*" should now be retained.

I am, yours faithfully,

WALSINGHAM.

BOOK NOTICES.

Bulletin No. 3 U. S. Department of Agriculture, Division of Entomology ; Svo., pp. 75.

We are indebted to Prof. Riley for this useful report of observations and experiments in the practical work of the division. It contains further notes on the Army Worm, details of an interesting series of experiments with Pyrethrum powder on larvæ, notes on forest-tree insects by Dr. A. S. Packard ; on the Cotton Worm and the machinery which has been devised for destroying it, and on the tree borers of the family *Cossidæ*, by the late Dr. J. S. Bailey, of Albany, N. Y. The closing paper is by W. McMurtrie, on tests of silk fibre from cocoons raised at the Department. This report contains much valuable matter. The paper on the *Cossidæ* is illustrated by two plates beautifully executed ; there is also a plate illustrating the chapter on silk fibre.

A Bibliography of Fossil Insects ; by Samuel H. Scudder ; republished from the bulletin of Harvard University ; Svo.; pp. 47.

A valuable compilation, which will greatly aid the student in this department of natural science.

On the Color and the Pattern of Insects ; by Dr. H. A. Hagen ; from Proceedings of the American Academy of Arts and Sciences.

In this paper the author discusses the various theories which have been propounded to account for the diversity of pattern and color in insects, reviewing the facts which have been cited for their support. It is a most interesting and instructive article, at the conclusion of which the writer expresses his conviction that color and pattern in insects are produced by physiological processes in the interior of their bodies.

Bulletin of the Buffalo Naturalists' Field Club.

The fifth number of the first volume of the records of work done by this enterprising body of naturalists is before us. It includes notes on *Protozoa*, by Prof. Kellicott ; also papers on the Butternut, Indian Relics and other interesting subjects, followed by botanical and ornithological notes. This serial is handsomely gotten up, well printed on excellent paper, and is in every way a credit to its promoters.

(October No., issued Nov. 27, 1883.)

(November No., issued Jan. 17, 1884.)

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